THE

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RECONSTRUCTION MOVEMENTS.

DURING the past 12 or 18 months we have endeavoured to keep our readers informed respecting Government investigations of problems of reconstruction and preparations that were in progress for the introduction of measures for carrying into effect schemes which, as a result of careful deliberation, were considered necessary in the interests of the well-being of the nation.

The end of hostilities came with greater suddenness than was expected, and our Government reconstruction measures may not have been sufficiently advanced; but, as we have shown in these pages, many of the leading engineering and electrical manufacturers have been making their preparations for a long time, and in their case the change over from munitions to normal manufactures will probably be conducted with greater smoothness than in some others. Theirs have been practical reconstruction operations for which no Parliamentary executive powers have been needed, though, to a certain extent, they have been made contingent upon the attitude of Government towards British manufacturing industries of their class, and upon the lessening of controls, the availability of raw material, and the provision of tonnage for accommodating export trade, which everybody recognises must be resumed and accelerated with the greatest possible expedition. Some further interesting developments that are being proceeded with by British manufacturers are referred to in our "City Notes" to-day, notably in the report of the speech delivered by Mr. Cayley at the meeting of Dick, Kerr & Co., Ltd.

The Armistice was signed on Monday, last week, but several days earlier official statements were made by the Minister of Munitions regarding contractors, workers, and productions coming under his control. Almost immediately after the signing of the Armistice, the flood-gates of official matter were flung wide open, and since then there has been a full and continuous flow of announcements.

We wish that the paper and, therefore, the space at our disposal permitted us to do all the proceedings justice. That, however, is quite impossible. There is to be a gradual suspension of munitions manufacturing; the Ministry of Munitions is to become the Ministry of Supply; political conferences have been taking place, in which policies regarding demobilised war-workers and soldiers have been discussed; there has been a conference between Ministers and employers and workpeople on the maintenance of war rates of wages for six months, so as to cover the period during which the cost of living may fall, and the necessary Bill is practically through Parliament; the Minister of Reconstruction has made a lengthy statement in the Commons respecting the proposals of his Departments and the work of his Committees; the Minister of Munitions has issued an Order concerning the transfer and discharge of munition workers and their treatment as regards wages, allowances, priority, &c.; both the Minister of Munitions and the Minister of Reconstruction have let it be known that they are open to receive proposals from industry for the future possession of some of the great national factories established during the war; restrictions on imports and exports of a number of classes of goods have been withdrawn, and more are to follow; in short, a great deal has had to be done in a hurry to facilitate the return to normal industrial operations. Labour has voted the withdrawal of its members from the Ministry, and the Premier has described that action as the height of folly. Mr. Barnes has severed his connection with the Labour Party. Last, but by no means least, Mr. Lloyd George has made public the coalition policy respecting Imperial Preference, "key" industries protection, the future of the railways, tramways, &c., and the development of electric power supply.

We are compelled to assume that manufacturers and munition workers have been familiarised with many of the official pronouncements through the usual channels, but we must in conclusion draw the attention of all our readers to a twopenny pamphlet issued by the Ministry of Reconstruction on "The Demobilisation and Resettlement of the Army." It is important that everything should be done to assist the Forces, so that there may not be a shadow of doubt in their minds as to their position. The pamphlet ought to be given to every man as he is discharged—indeed, some millions of copies might with advantage be sent "over there" for them to study while matters are quieter and while they have time to think out their personal movements. Our correspondence has shown us that they have been thinking somewhat deeply; and while expert authorities are giving attention to their education and training as they wait for the signing of Peace terms, this question and answer pamphlet should be useful to them.

Wise Words from Lord Burnham.

In order that the foundations of prosperous industry and contentment in national life may be well and truly laid, few things are of greater consequence than the spirit in which we all approach the very difficult problems of demobilisation and the transfer from war work to Peace activity. We are aware that there is nothing either new or original in this remark. But it seems to be very necessary that we should say it at this particular juncture. Last week the Industrial Reconstruction Council listened to an interesting lecture from Sir A. Steel Maitland, which was full of suggestiveness in regard to the momentous changes which may be upon us. We all stand under obligations, which cannot be ignored, toward all who earn their livelihood in industry, and no reasonable proposition should be condemned without a proper hearing. For reactionary spirits among employers there will be no room to-day. Negotiations should be entered into with the goodwill which will go as far as possible, not just as far as compulsion dictates, in simplifying the settlement of industry. Of course, there will, as always, perhaps more so, be demands of an impossible nature forthcoming from visionaries or from those who shut their eyes to the danger of killing the goose that lays the golden eggs. But there will be many other matters that do not come within this category containing germs which, while not dangerous in the early stage, may be hurriedly developed unless they are met in the spirit which the peculiar times require. Interesting as Sir Arthur Steel Maitland's address was, we consider that the more important part of the proceedings at the Industrial Reconstruction Council, was to be found in the remarks with which the chairman, Lord Burnham, closed the meeting. With very weighty words he warned his hearers that, notwithstanding all that had been done on paper to prepare for the period of demobilisation and reconstruction, things were not practically ready for the great changes that were upon us. He appealed to the employers of the great City of London to open their doors wide for the ready return, and for the happy and contented absorption into industrial and commercial life, of those who left them in order to take up arms. It is perfectly true that many businesses have not been conducted with too great success during the past few years, and that taxation is heavy and is likely to continue so; but a warning must be given against the adoption of a short-sighted policy even in these cases. Ill weeds grow apace, and there are plenty of sowers of tares about who would choke the growth of all the good that should result from the terrible sacrifices of the war. The best way to defeat the objects of mischief-makers who would like to see industrial disorganisation here as elsewhere, is to display a broad-minded and generous policy in finding work for those who have saved the British Empire and, therefore, its industries. Most of the firms connected with electrical and allied manufacturing have a period of great activity before them, and they will have less difficulty than some trades in absorbing the specialised professional men and industrial workers who will be returning ere long; but the appeal of Lord Burnham requires to be made to others as well, and we make no apology for passing the counsel on to them.

World Communications.

From what we have published in these pages during the past twelve months, it has been plainly seen that the editors of newspapers published in different parts of the British Empire are unanimous in their appeal for additional cabling and wireless facilities to be established. Notwithstanding the interesting developments of the last four years, concerning which little can even now be said, the Press has found few things so great a handicap to community of thought as inadequacy of facilities for the freest possible flow of information and opinion between the Mother Country and all the branches of our Great Family. Cost, congestion from various causes, censorship and its delays, have given rise to restriction of communication, to ignorance abroad concerning the real state of things at the Front and at Home, and to a good deal of irritation not only among public newspaper men but among the people whose interests they serve. We are not now discussing the technical aspects of submarine or wireless telegraphy; we are addressing ourselves to the general question, and in urging that the whole matter of telegraphic communication throughout the world be taken in hand at once for expert investigation as part of the great work of reconstruction, we find considerable support in a letter of the London Correspondent of the Philadelphia *Public Ledger* (H. J. Learoyd). He advises that "in the interests of Anglo-American information and mutual understanding" no time should be lost in "multiplying the Atlantic cable services which have so utterly failed recently to meet even urgent demands." It has been an unfair tax upon the Press, which has had such power in fostering a good understanding between the States and ourselves during recent days, to have had to pay commercial rates for practically all messages from Europe to America. But what is of such great importance is the absolute certainty that vast developments of interest have been aroused between this country, the States, and the Empire during the past four years, which justify Mr. Learoyd's statement that "there is no probability that present existing facilities will ever again meet requirements." He says: "With the expanding interests and demands already in sight, it is plain the only way to approach the subject effectively is from a broad constructive point of view. Repairs are urgently needed, but additional cables are the only possible solution." His mention of the "broad constructive point of view" reminds us that the matter stands far higher than if it had to be considered as a mere commercial proposition—a question of dividend return on capital invested. The consolidation of British and Inter-Allied interest will bring so valuable a compensation as to render percentage of profit a comparatively unimportant matter. It is well known that we range ourselves alongside those who think it folly to plan immense outlays upon great public social schemes, after the world's prodigal expenditure upon war, until we can see better where we stand; but there are practical proposals for the world's highest good and for the fostering of commerce which are an absolute obligation resting upon us all in these days, when we know well enough we must find national revenue to make up for recent waste, and must provide work for our population in our greatly-extended factories.

A matter of more immediate practical politics, which must be dealt with, is the removal of the censorship of foreign cablegrams, and of the ban on private commercial codes. We do not ask for complete relief one moment earlier than will be absolutely safe, but all handicaps on our foreign trading operations ought to be got rid of as speedily as possible. Of course there is the danger that Germans, through neutrals, will take advantage of any relaxation of commercial cable censorship, and flood the cables with their messages in furtherance of their own export trade interests. Complete removal of cable censorship is quite impossible at the moment, but inasmuch as commercial cable messages are of such vital importance in trade reconstruction, it should be modified as far as can be, with reasonable security, without delay.

Indian Water Power.

Elsewhere in this issue we give abstracts of two papers relating to the industrial development of India, and we wish to lay emphasis on the extraordinary interest which attaches to this question—a matter of vital importance to the Empire, and incidentally to the British electrical industry. Our contemporary, *Indian Engineering*, directs attention to the rapid progress which is being made by the Native States of India, whilst British India is appointing Commissions and achieving nothing. The State of Gwalior, for instance—under a ruler noted for his progressive and enlightened administration—has sanctioned a scheme involving the generation of 8,000,000 KW.-hours a year, is laying out an industrial city under the direction of Prof. Stanley Jevons, and is promoting the establishment of no fewer than 25 factories. It is estimated that the water-power resources of this State alone could furnish nearly 7,000 million KW.-hours annually, and that the smelting of iron ore, the production of aluminium, and the manufacture of paper pulp, as well as a variety of other industries, can be profitably entered on. Iron ore and limestone are plentiful in Gwalior, but coal is not available within 600 miles of the State, so that electric furnaces, with charcoal as the reducing agent, have a most favourable opportunity for demonstrating their merits. The report of the Water-Power Committee which we recently abstracted shows that abundance of power is available in other parts of India; Mr. Joyner states that there are many places where the conditions are even more favourable than those under which the remarkable undertaking of the Tata company was carried out, and Mr. Dickinson refers to a site on the Koyna River whence 300,000 H.P. can be readily obtained continuously, or 730,000 H.P. during the normal working hours.

Such figures are amazing; taken in conjunction with the material economic resources of India, they indicate the immense potentialities of Indian industry which are as yet practically untapped. In passing, we would particularly direct attention to the fact that the great scheme of the Tata Hydro-Electric Power Supply Co. was planned and carried out by British engineers, and, to a large extent, equipped with British plant; there is no reason whatever why future schemes should not be *entirely* British—we have the men, the experience, and the ability to tackle any hydro-electric scheme whatever.

But we must not ignore a most important factor in the problem of developing the industries of India—the financial aspect of the matter. The Tata scheme could not be financed in London—it was readily financed in India; and other large schemes promoted by Indian business men are on the cards. Mr. Dickinson points out in his weighty address that the European must drop his exclusiveness, and admit the cultured Indian to his society on level terms—as a partner, not as an inferior. The educated Indian is no whit behind the European in intelligence and ability, and he resents the haughty attitude of the European resident; unless that insular exclusiveness is profoundly modified, the consequences will be serious. India has established her claim, by loyalty, enterprise, and intelligence, to a full voice in the conduct of her industrial affairs, and she will not be denied.

An important report by the Indian Industries Commission has recently been published in India, but, so far, only a summary has reached this country; from this we gather that the report directs attention to the vital necessity of ensuring the establishment in India of those industries whose absence involves grave danger in the event of war, and refers to the harnessing of water power as affording a reliable source of energy, especially with a view to the development of thermo-electric industries. The Government is, therefore, urged to undertake a hydrographic survey, to determine the places which offer possibilities for the establishment of hydro-electric installations; as noted in our issue of November 8th, this survey has been set on foot. It is clear that the possibilities of industrial development are immense, and British electrical manufacturers would do well to maintain a close connection with this colossal market for their products.

Rural Amenities in Great Britain.

The imperative necessity of developing our agricultural industries, and to that end improving the amenities of country life, was one of the prominent features of the election address delivered by Mr. Lloyd George on Saturday last. The importance of this subject is beyond question, and it is of special interest to electrical men, because they can do a very great deal towards increasing the comfort and adding to the attractions of rural occupations. As Mr. H. Rider Haggard points out in a letter to *The Times* of Tuesday last, one of the most depressing factors which tend to drive people from the country to the towns is the "appalling darkness" during the winter months. We have on many occasions drawn attention to the merits of electricity supply as a means of mitigating this and other drawbacks, and we cordially endorse Mr. Haggard's suggestion that the development of electricity supply for lighting, heating and cooking in country villages would be a godsend to the residents. A very cheap supply is not so necessary as a very general supply. Mr. Haggard is mistaken if he supposes that this country is blessed with abundance of water power; in certain mountainous districts, it is true, a great deal can be done with *small* hydro-electric installations, as was shown recently in our pages by Mr. Thos. Smith, who gave some particulars of 200 small plants put down in Wales by a single firm*; but, as a rule, there is nothing to hope for in this connection. On the other hand, there is no agency so readily controllable as electricity; a combined oil engine and dynamo is an extremely simple and manageable machine, and there is not a village in the country, we should say, which does not now contain at least one man capable of running a petrol or oil engine. Thousands of such sets will shortly be coming back from France and other fields of war. It will be not months, but years, before the general supply of electricity is extended to all the little hamlets that are crying out for it, no matter how energetically the Government may develop the national scheme (and, to say truth, we have not yet seen a particle of evidence that it is acting at all in this matter). To many of the more isolated villages the public mains will never be extended.

Now, why should not those discarded lighting sets, thrown idle by the cessation of the war, be placed at the disposal of our village Councils, on easy terms, and used for the immediate introduction of electricity supply on a small scale? At first, no doubt, it would be necessary to restrict the demand to lighting; but ten kilowatts will supply no fewer than 300 25-C.P. lamps alight at once, or, say, 600 connected—enough for a good-sized village. The generating cost, with cheap oil fuel (and any petrol engine can easily be adapted to run with tar oil) would be small; light overhead conductors would distribute the current; no battery or other complication need be installed—an occasional failure of supply for an hour or two would not matter. We believe that some such plan would confer a great boon upon countless homes, besides efficiently utilising war material, and we earnestly press it upon the notice of the authorities.

High-Pressure Operation.

As the hour approaches for going to press, a torrent of matter of the first interest and importance is flowing in, taxing our limited space to the utmost; we are compelled to defer many items to a later issue, and to postpone our comments on some of the subjects dealt with in this issue. For the moment we must be content with drawing attention to the important report of the Council of the I.E.E. on Patent Law Amendment; the schedule of working conditions and rates of pay in electrical undertakings which has been agreed between the Committee on Production and the Trade Unions; and the statement of extensions to electricity works during the war, issued by the Ministry of Munitions—an astonishing record, which speaks for itself, and incidentally may be regarded as the reply of the Ministry to the attack recently made upon it by the I.M.E.A. Council. We hope to comment on some of these items next week.

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*Electrical Review, August 30th, 1918, p. 197.

THE GRADING OF DIRECT-CURRENT STARTER RESISTANCES.

By PERCY H. JACKSON.

The calculation of a resistance for a direct-current motor starter necessitates the careful consideration of the following factors :—

(*a*) The maximum value of the current peaks when switching on from contact to contact must not exceed 150 per cent. of the rated full-load current of the motor.

(*b*) The grading must be in the form of a geometrical progression.

(*c*) In order to reduce to a minimum the flashing between contacts, the spark volts must be limited to a predetermined value.

(*d*) The current allowed to pass on the first contact must be such as will avoid excessive flashing when switching off.

The realisation of these ideals is dependent upon the number of contacts provided, which number is, unfortunately, limited by trade competition. Nevertheless, it is possible to obtain successful results if the calculator will keep before him the foregoing requirements.

Many text-books deal with the methods adopted in calculating starter resistances, but the details are so vaguely explained as to render but little assistance to those without knowledge on the subject. A simple explanation, therefore, may be appreciated.

Take, as an example, a 50-H.P., 440-volt, direct-current starter resistance. If calculated correctly, the results will be as shown in fig. 1.

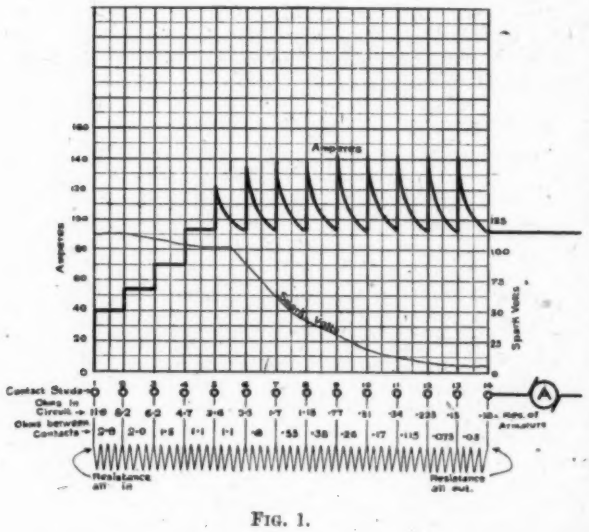

Fig. 1.

Let us deal, first, with (*a*), and ascertain what is meant by "current peak," why its value must be limited, and how it is calculated.

When starting a motor with an ordinary face-plate starter the resistance is cut out in steps, allowing the motor to accelerate as each contact is passed. At the moment of cutting out of circuit each step of resistance, the current will increase above the normal starting current to an extent governed by the amount of resistance remaining in circuit. This rush of current is momentary only, and again falls rapidly to normal as the motor gathers speed corresponding to the amount of resistance still remaining to be cut out.

The specification for starters for electric motors which is recommended by the British Engineering Standards Committee states that the maximum value of the current peak must not exceed 150 per cent. of the rated full-load current. This requirement is based on experience. Large rushes of current will sometimes interfere with the proper working of other apparatus on the same circuit. Furthermore, the overload coil on the starter very obviously must be set to operate at a higher current than the current peak, otherwise this would operate during the starting period, with the result that the "hold-on" coil would be short-circuited, because the normal current will be sufficient to retain the armature of the overload coil against the cheeks of the same when once it has pulled up. If, then, the current peak, as in fig. 1, is equal to 150 per cent. of the normal full load current, the overload coil on the starter must not be set to operate at a value lower than this. The usual setting of the overload coil is between 150 and 200 per cent. of full-load current.

As stated previously, the current peak, or maximum current when switching on from contact to contact, is governed by the amount of resistance remaining in circuit. In the example we have chosen, the normal full-load current of the motor is 94 amperes. The peak, therefore, must not exceed 14 amperes. For example, refer to contact 7, the resistance in circuit is 1·7 ohms. Imagine the starter lever moved quickly to contact 8, leaving in circuit a resistance of 1·15 ohms. Before the motor has had time to increase in speed, consequent upon the reduction of resistance, the current jumps to a value equal to the starting current × the resistance in circuit before switching on ÷ the resistance in circuit after switching on. This amounts to $94 \times 1{\cdot}7/1{\cdot}15 = 139$ amperes, or 148 per cent. of the rated value.

Take the starter a step further, and we have $94 \times 1{\cdot}15/0{\cdot}77 = 140$ amperes, and so on until the "full-on" position is reached.

If the resistance is in the form of a geometrical progression the value of the current peak remains constant at all contacts, and it becomes necessary to calculate one step only.

Referring now to (*b*) it is, of course, agreed that the grading of the resistances must be in the form of a geometrical progression to ensure even acceleration of the motor. Most text-books explain the method of obtaining this and also the mechanical method suggested by A. E. N. Pochin,* but the quickest method is undoubtedly the outcome of practice. To anyone frequently engaged on resistance calculation a rough mental calculation will show an approximate geometrical progression which can quickly be converted to accuracy by means of the slide rule. In the chosen example the resistance in circuit on the last contact—viz., the armature resistance—and the resistance required to start the motor—*i.e.*, on the fourth contact, are known values. Now, the grading must be such that the ratio between the ohmic value in circuit on contacts 14 and 13 must be similar between contacts 13 and 12, and so on as far as contact 4. Let us make a mental calculation, and assume that the resistance shall double itself at each contact; it is quickly realised that such a ratio is too large. Now take a slide rule, and, using the top scale, place the figures on the slide representing the armature resistance—viz., 0·1—against any figure lower than 0·2 (double its value) on the fixed scale, for example, 0·17 ; now read off as 0·1 is to 0·17, so 0·17 is to 0·29, and so on. Again, it is realised that the ratio is too large. Further attempts will soon realise the desired objective. The writer finds this to be the quickest method yet devised.

Reference to (*c*) shows that the spark volts between contacts must be limited to obviate flashing. By spark volts is meant the voltage absorbed by the resistance between any two adjacent contacts. For example, the resistance in circuit on contact 1 is 11·0 ohms, whilst that in circuit on contact 2 is 8·20 ohms, the difference being 2·8 ohms. Now, as the current allowed to pass is 40 amperes, the spark volts will be $40 \times 2{\cdot}8 = 112$. Between contacts 2 and 3 the resistance is 2·0 ohms, and the current allowed to pass is 54 amperes, therefore the spark volts amount to 108. After the maximum current has been reached, the resistance between contacts falls in value, consequently reducing the spark volts, from which it will be gathered that the first few contacts are those which require the most careful grading in this respect. If sparking between contacts is to be eliminated altogether, then a sufficient number of contacts must be provided to allow of the volts being kept within the neighbourhood of 40. The cost of such a starter would be prohibitive if it were desired to

* Electrical Review, August 19th, 1904, page 287.

compete successfully with modern apparatus. However, experiments have shown that if the voltage absorbed by the resistance between contacts is limited to about 120 for this size of starter, satisfactory results will be forthcoming if the starter is used properly. If, when starting the motor, the starter handle is allowed to travel back slowly for such a distance as will insert one of the earlier steps of resistance, then heavy flashing will surely result, and often with disstrous consequences, and for this reason it becomes necessary for the prospective purchaser to consider the conditions under which the apparatus will be used. If it has to be handled by one whose knowledge of electrical apparatus is nil, then a step-by-step mechanism which prevents the lever travelling back slowly must be provided.

Referring now to the fourth factor (*d*), which we are considering, the current allowed to pass on the first contact should be limited to avoid heavy flashing when switching off. This value varies according to the capacity of the starter, but for a 50-H.P., 440-volt starter a maximum of 40 amperes may be assumed.

Specifications frequently determine the maximum initial current which has to be worked to, but, apart from this, the life of the starter must be considered. Although a quick break is provided, this is not sufficient to prevent heavy flashing if the full-load current is allowed to pass on the first contact of a 50-H.P. starter.

We have already found that if the motor starts on the fourth contact, this allows of the grading being such as will give a current peak not exceeding 150 per cent. of full-load current, and, consequently, take advantage of the first three contacts to build up the current. It might be concluded that the difference between the initial current and starting current values might be equally divided as follows :—Contact 1, 40 amperes; contact 2, 58 amperes; contact 3, 76 amperes; contact 4, 94 amperes, which gives an increase of 18 amperes per step. Such a conclusion would be totally wrong, because the spark volts between the first two contacts would be too high, hence the necessity for governing the current increments by the spark volts, and not *vice versâ*.

FACTS FOR RECONSTRUCTIONALISTS.

By M. E. NICHOLLS.

The dramatic turn of events at the Front, which without a doubt herald the speedy approach of Peace, must of necessity hasten the deliberations of those good people who have been selected to sit upon the Committee on Reconstruction, to investigate and to calculate, and to formulate some plan which will regulate the change over from war to peace industries. Particularly urgent is the problem of settling in civil life the demobilised soldiers and sailors, and also the future destiny of the great mass of people who, for the past three or four years, have been engaged in the great munition factories of the country.

A great many of these munition factories, which before the war were old-established engineering concerns, will, upon the cessation of hostilities, revert to their pre-war specialities, or embark upon a new line of manufacture, of a competitive character. It may safely be assumed in these cases that the number of persons employed will not diminish to any appreciable extent, although it must be borne in mind that thousands of demobilised soldiers, who, prior to joining the Colours, were employed by these firms, must be given the opportunity of resuming their positions, priority being given them over the people who entered the factories during the war period.

The great national factories, which have come into being during the war, will, no doubt, be utilised for the purpose of producing lines of manufacture which have been in abeyance during the past four years, and these factories will provide employment for many thousands of people. In this connection, however, the fact must be faced that the existing numbers of workers will probably have to be reduced, and that here, as in other factories, the employment of demobilised soldiers must be the prior consideration.

It is a mistake to assume that all the women will leave the engineering factories at the end of the war. Many thousands will, no doubt, do so, but more thousands will desire to remain. These women, who have served a three or four years' apprenticeship (though at a much higher rate of pay than is usual) are now proficient in their respective spheres, and will be extremely useful to their employers in the coming competitive era. Business is business, and the employer, as a rule, is not disposed to lose the services of a valuable worker for either sentimental or patriotic reasons.

It may, however, be assumed that all these points are receiving the consideration of the Committee, and that some practical scheme is being formulated with a view to distributing labour to the best advantage. The Government of the day is usually solicitous for the welfare of the manual worker, even though the help received from that quarter is not, perhaps, very substantial. A very different state of affairs exists, however, in the case of the clerical worker (who has always been looked upon as fair game by the employer), and it is quite possible that this class of worker will be overlooked, or, at the best, inadequately considered by those who are now deliberating.

The clerical staffs of the munition factories are mainly composed of women and low-grade men (physically), many of whom must be displaced when the original occupiers of their stools and chairs are released from the Army. Owing to the exigencies of war-time production, the numerous and detailed reports required by the Government Departments, &c., these staffs have swollen considerably, and there will be a big reduction in numbers when these conditions are no longer applicable. Even in pre-war days, the firm deciding to practice economy usually selected the staff as the first subject upon which to commence operations, and when the time arrives, when reconstruction is necessary, there is no reason to suppose that this procedure will be reversed. The stalwarts of the factory, whether clerical or otherwise, will, of course, receive favourable treatment, but with regard to the clerical rank and file, the position is somewhat obscure.

As with the manual workers, many women will relinquish their posts at the cessation of hostilities; but many will desire to remain. Many of the male workers, who have only entered the factory for the duration, will return to their own avocations as soon as circumstances permit; but these numbers will be more than equalled by the return of the soldiers.

It must be remembered that these people have not been paid the high wages which have fallen to the lot of the manual worker, consequently they have not been able to put a deal away for a rainy day. It is true that they have been granted war bonuses from time to time, but the total amount they have received in this direction has been more than counterbalanced by the high cost of living. The maximum war bonus paid to clerks at the present time varies between twenty and thirty shillings per week, and no one can deny that the cost of living per week for any one family has risen considerably in excess of these figures. These bonuses, too, have in many instances taken the place of increases in salary, so that the clerk, almost alone among the munition workers, is actually in a much worse financial position than he was before the war. The four-pound-a-week clerk (including thirty shillings war bonus) is still so rare as to excite the interest and the envy of his brothers, and what can be saved out of that sum by the man with a wife and family to support, in these days of high prices?

The clerk may be a very efficient worker when once he has become conversant with the system and the routine of the factory in which he is employed; but when his services are dispensed with this qualification is a small recommendation when applying for a fresh post. His duties are essentially of a routine character; and as the system prevailing in different factories varies considerably, it is obvious that he must serve a probationary period before being of much practical use to his new employer.

The mechanic always has his craft with which to barter, and by presenting himself at the factory gates he gets into touch with interested officials, and has the opportunity of personally stating his case. The clerical worker, however, is debarred by precedent from making a personal application for employment in the first instance, and has to rely upon his ability as a letter-writer to succeed in convincing

the prospective employer that he is qualified to perform the duties required.

The only hope for the clerical worker is for him to specialise in one particular branch—such as wages, time, costs, and progress, which are universal throughout the engineering industry—and in this way the experience he has gained in one factory will prove a valuable asset in connection with his application for employment elsewhere. He cannot afford any longer to generalise, for the general clerk is a routine clerk, who is not wanted outside the one factory whose system he thoroughly understands.

The clerical profession has been overcrowded for years; and if there are any apprehensions of approaching unemployment, it may be taken for granted that the clerk will suffer severely. It is this fear that has inspired this article, and it is really necessary that special consideration be given in this direction. A large proportion of the engineering-works staffs at the present time are disabled soldiers, many of whom are incapable of performing manual labour, and numbers of these men must necessarily be displaced when general demobilisation is decreed.

It is a problem which will tax the ingenuity of the best brains in the country, and it demands early attention.

PATENT LAW AMENDMENT.

Last year the Council of the Institution of Electrical Engineers appointed a committee to consider the reform of the Patent Laws, in connection with the Bill introduced by the Board of Trade in 1917.

The report of the committee was adopted, by the Council in June last, and was also adopted, subject to a few verbal alterations, by a conference of representatives of some thirty leading scientific and technical societies, convened by the Institution of Mechanical Engineers. A deputation from the conference waited on the President of the Board of Trade on October 10th, when the report formed the basis of the representations made to the Board by the deputation.

We have received from the secretary of the Institution a copy of the report, which, it will be seen, may be regarded as embodying the views of practically the whole of the engineering industry, and is therefore of exceptional importance. The committee consisted of the following members:—Mr. W. M. Mordey (chairman), the President (ex-officio), Mr. A. E. Cachemaille, Dr. S. Z. de Ferranti, Mr. J. Hunter Gray, Mr. John Gray, Mr. H. H. Harrison, Mr. S. Morse, Mr. D. Murray, and Mr. A. P. Trotter. [Mr. Cachemaille and Mr. John Gray represent the British Electrical and Allied Manufacturers' Association on the committee.] The following is an abstract of the report:—

Introductory Statement.—It is common ground that invention is the basis of industrial progress, but invention must be encouraged, and, if the reward offered by the State takes the form of a monopoly for a term of years, such a monopoly must be of a kind that will encourage capitalists to assist in developing commercially the inventions in which they are invited to take an interest. Without capital, few inventions can be developed or even made. At the best, monopolies in the form of letters patent, depending, as they should, on the question of novelty, cannot be regarded as gilt-edged securities, but it is possible, by legislation and otherwise, to provide that those who expend thought or time or money in devising useful processes or products shall obtain in return for a real invention a true monopoly which cannot be revoked.

The committee is convinced that the progress of invention during the past 25 years in this country has been much less than it would have been if proper encouragement had been given by legislation and otherwise. The effect of legislation as a stimulant or deterrent can hardly be overestimated. It is a standard upon which public opinion is largely moulded, and by which it is guided. Legislation couched in language which expressly or by influence treats inventors as meritorious or unmeritorious must exercise profound influence on the industries, all of which depend upon invention.

At no time in the history of this country so much as the present has there been so urgent a need or so great an opportunity for placing invention in the most favourable condition to help industry, and it is with this conviction that the committee has carefully considered the proposed Bill. It feels that the latter will not only not encourage, but will discourage, both inventors and capitalists, inasmuch as it adds to the already large risks of patentees, and still further lessens the value of letters patent as securities for the advance of money to develop inventions. It is of opinion that every effort should be made to reduce, if not to remove, the number of weapons available to people here and abroad, especially the latter, for attacking patentees who own real inventions, and in many cases have spent much time and money on them.

Patents Moratorium.—An extension for a period equal to the total duration of the war should, on application, be granted in the case of those patents which were in force when the war broke out, and are still in force when peace comes; in the case of patents which have expired by lapse of time during the war, the extension should be for a period equal to that from the commencement of the war to the end of the ordinary life of such patents; and for patents, other than war patents, which have been taken out since war commenced, the extension should be for a period equal to that between the date of application and the end of the war. It may be said that any automatic extension would unduly favour war patents, but such patents would be unremunerative after the war, and would therefore gain no benefit from extension.

It is satisfactory to note that in stating in the House of Commons that the Patents and Designs Bill was to be reintroduced this session, Sir Albert Stanley announced that it would contain clauses dealing with the life of patents, the working of which had been prevented during the war.

Clause 7 of the Bill which amends section 18 of the Act does not deal with the real difficulty. Under this clause the position still is that the extension can only be granted in the case of inventions of especial merit as before. The Bill perpetuates the evils of the present procedure, which are such that the number of petitions for extension presented annually is under ten, and in no year have more than three patents been extended. Something very different is needed to meet the war difficulty. No scheme of extension will be effective unless it is simple and inexpensive. The great majority of patents have, by reason of the war, been deprived of a considerable part of their useful term. To meet this condition a very general extension is desirable.

The renewal fees for such extended period should be low, for two reasons: (*a*) the renewal fees will have already been paid, generally on unproductive patents, and (*b*) renewal fees involve no appreciable expense to the Patent Office. It is therefore suggested that these fees should not be more than £1 per annum.

Compulsory Licences and Working of Patented Inventions.—Clauses 1 and 2 are intended to replace sections 24 and 27 of the Act. Section 24 provided for the granting of compulsory licences under certain specified circumstances, and section 27 dealt with the working of patented inventions. The latter section was introduced into the Act to compel foreign owners of British patents to work them in this country. It is very doubtful if it achieved its purpose in any single case, but it became a powerful lever with which foreigners could and did harass British patentees for some years. It was obviously to the interests of a foreigner (in most cases he was a German) to revoke patents belonging to a British subject so that he might freely flood the market with imported articles.

The committee is of opinion that section 24 of the 1907 Act with alterations, which are indicated below, would be amply sufficient, and much to be preferred, to clauses 1 and 2 of the Bill, which are not required.

Letters patent properly granted require that the invention should be new, should disclose sufficient invention, and should be properly and sufficiently described. If these requirements are complied with, it is, in the opinion of the committee, wrong and illogical that the letters patent should be revocable on the ground of non-working, except with the consent of the owner. The only justification for revoking a patent is that it is invalid. If the owner does not exercise his monopoly so as to give substantial benefit to the public there are remedies other than revocation which can be applied. No remedy should be capable of being applied except in favour of someone who himself is ready and willing to do what he alleges and proves that the patentee has failed to do, namely, to give substantial benefit to the public. Such a person can under the Act apply for a compulsory licence, and non-working is a good ground for granting such a licence.

The possibility of revocation on the ground of non-working is an incentive to blackmailers, and greatly detracts from the value of a patent as a security for financial support.

Even if there were no complete remedy other than revocation, which is not the case, it is doubtful if revocation should be possible, owing to the serious and disturbing influence it would have upon the progress of invention. It would penalise British patentees for the faults of foreigners. The same considerations apply to designs.

The so-called "abuse of monopoly rights" has been during the last 20 years almost, if not entirely, confined to foreigners, especially Germans, who obtained British patents and did not work them in this country, but held them for the sole purpose of stopping competition while they imported the patented articles. Obviously nothing could suit them better than the right to revoke British patents which interfere with their importation. The history of section 27 of the 1907 Act is strong evidence of this, as practically most of the applicants under this section were foreigners or persons who desired only to import the patented article. This matter can be properly dealt with without revocation.

The course which the committee would like to see adopted is that section 27 of the 1907 Act should be repealed, and that section 24 of that Act should be altered by enacting: (1) that the petition should be made to the Comptroller of Patents with appeal to the Court who would deal with it; (2) that the provision enabling the patent to be revoked

should be cancelled. This, it is believed, would be most in the interests of invention and of industry. The "reasonable requirements of the public" is an expression much more likely to lead to commercial development than the expression "abuse of monopoly rights." The former expression appears in the forefront of section 24. It seems clear that provisions for compulsory licences are amply sufficient to protect the public from the danger of patentees holding up their patent rights. Such holding up as there has been has been largely done by foreigners, especially Germans, and simple machinery for obtaining licences from them would soon cause the evil to disappear.

(To be concluded.)

ELECTRICITY WORKS EXTENSIONS DURING THE WAR.

The following statement has just been issued by the Ministry of Munitions, and will be found exceedingly interesting. We understand that the figures showing the extensions during the war only cover those undertakings which have added or ordered additional engine-room plant since June 30th, 1914.

	Municipal.	Company.
Total number of undertakings operating	327	230
No. of undertakings who have installed or have been authorised to install more plant ...	56	20
Plant capacity of undertakings referred to above at June 30th, 1914	500,071 KW.	351,685 KW.
Additional plant installed or sanctioned (July 1st, 1914, to October 31st, 1918)	645,072 KW.	324,453 KW.
Proportion of additional plant sanctioned by present Director of Electric Power Supply ...	219,565 KW.	85,000 KW.
No. of schemes sanctioned by him	32	10

(Note.—In the following schedule, the foregoing figures are shown in detail.)

The units sold by the above 76 undertakings were as follows:—

Year.	Municipalities.	Companies.
1917	1,384,185,750	1,160,337,146
1914	802,333,100	691,116,312
Increase in three years	581,852,650	469,220,834

Certain statements have appeared in the Press during the past few weeks, evidently based on inaccurate information, alleging that the Sheffield district is denied electrical expansion, while the North-East Coast undertakings are permitted to develop. The following figures bring out the facts:—

	Sheffield Corporation.	Rotherham. Corporation.	N.E. Coast Power Cos.
	KW.	KW.	KW.
Plant capacity of power stations in 1914	23,225	5,150	86,200
Installed or ordered since ...	73,000*	65,350	114,200
	138,350 KW.		
Total plant capacity installed or on order	96,225	70,500	200,400
	166,725 KW.		
Increase on 1914 of	580 p.c.		232 p.c.
Area of supply	60 sq. miles.		1,400 sq. miles.
Units sold, 1917	186,220,901		563,365,976
Units sold, 1914	31,474,377		344,544,247
Increase in three years, units	154,746,524		218,821,729

* This excludes a further 50,000 KW. provisionally sanctioned for Sheffield.

Sheffield and Rotherham combined have installed or ordered during the war about one-seventh of the extensions of all the local authorities and companies combined.

The Ministry of Munitions commandeered for, or allocated out of their own plant to, Sheffield no less than 37,000 KW. of the additional 73,000 KW. which Sheffield has installed or ordered during the war. Some of this plant was commandeered by the then Director of Electric Power Supply (Col. McLellan) from that which his firm had previously ordered on behalf of various clients. He also placed at the disposal of the Rotherham Corporation, entirely free of charge, a complete set of drawings, specifications, &c., of the Melbourne power house (designed by his firm for the Victorian Government) to enable the Rotherham Corporation to save months of delay which would otherwise have been inevitable, with serious consequences to the district.

At the present moment Sheffield has 26,000 KW. and Rotherham 50,000 KW. of generating plant under construction with boilers to steam the whole, which plant should be available for operation between January and June, 1919.

MINISTRY OF MUNITIONS OF WAR.

Electric Power Supply Department.

List of Municipal Electricity Supply Undertakings which have installed additional generating plant during period June 30th, 1914, to October 31st, 1918.

Name of Corporation.	Plant capacity, at June 30, 1914.	Additional plant installed or authorised. Period, June 30, 1914, to Oct. 31, 1918.	Proportion of additional plant sanctioned by present director of electric power supply.	Graded.
	KW.	KW.	KW.	
1. Aberdeen	8,380	9,380	5,000	P.4
2. Alloa	309	1,607	715	
3. Ayr	1,100	1,500	—	
4. Barrow-in-Furness	2,525	5,000	3,000	P.4
5. Battersea	5,092	5,000	—	
6. Bedford	1,945	2,305	—	
7. Belfast	13,300	10,500	10,500	P.4
8. Birmingham ...	33,000	51,650	30,400	P.2
9. Bolton	7,600	10,900	7,500	P.4
10. Bradford	16,800	27,450	12,000	P.4
11. Brighton	12,100	4,000	4,000	P.4
12. Bristol	15,050	9,000	6,000	P.4
13. Burton	2,700	4,200	3,000	
14. Bury	5,700	3,000	—	
15. Carlisle	2,670	2,880	2,000	P.4
16. Chesterfield ...	1,800	2,320	—	
17. Derby	7,050	7,500	4,000	P.3
18. Glasgow	54,900	99,050	36,000	P.4
19. Hackney	4,800	13,400	6,000	P.4
20. Huddersfield ...	7,450	4,000	—	
21. Hull	10,210	5,000	—	
22. Ipswich	3,500	3,000	3,000	P.4
23. Kilmarnock ...	3,000	7,000	—	
24. Kingston	1,140	2,000	2,000	P.3
25. Leeds	22,940	33,660	12,000	P.4
26. Leek	515	200	200	P.4
27. L.C.C. Tramways	38,500	9,000	—	
28. Londonderry ...	1,200	2,500	2,000	P.5
29. Loughborough ...	700	2,150	—	P.4
30. Luton	2,450	10,000	5,000	P.4
31. Maidstone	2,075	1,900	1,500	P.4
32. Manchester ...	72,300	46,450	—	
33. Newport	7,100	3,000	3,000	P.4
34. Northampton ...	3,640	3,500	—	
35. Paisley	4,200	8,200	5,500	P.4
36. Plymouth	5,475	4,800	3,000	P.4
37. Poplar	10,000	4,250	—	
38. Portsmouth ...	4,450	2,000	—	
39. Redditch	690	4,770	3,000	P.4
40. Rotherham ...	5,150	65,350	30,000	P.2
41. St. Pancras ...	8,850	3,000	3,000	
42. Sheffield	23,225	73,000*	—*	
43. Shoreditch ...	5,680	5,000	—	
44. Stockport	4,850	11,150	—	
45. Stoke-on-Trent ...	7,650	3,000	—	
46. Southampton ...	5,500	3,000	3,000	
47. Sunderland ...	8,500	7,500	—	
48. Swansea	5,100	5,000	5,000	P.4
49. Swindon	1,400	2,000	2,000	P.2
50. Tonbridge	370	570	—	
51. Watford	2,500	1,250	1,250	P.4
52. Warrington ...	3,150	4,900	—	
53. West Bromwich ..	3,300	4,000	—	
54. Wigan	4,820	6,500	5,000	P4.
55. Wolverhampton ...	7,050	16,450	—	
56. Keighley	4,620	5,380	—	
	500,071	645,072†	219,565†	
			(32 sanctions.)	

* Further 50,000 KW. recommended.

† Note.—These totals omit 50,000 KW. sanctioned for Sheffield as soon as they sign linking-up agreement with Rotherham.

List of Company Electricity Supply Undertakings which have installed additional generating plant during the period June 30th, 1914, to October 31st, 1918.

Name of Company.	Plant capacity, at June 30, 1914.	Additional plant installed or authorised. Period, June 30, 1914, to Oct. 31, 1918.	Proportion of additional plant sanctioned by present director of electric power supply.	Graded.
	KW.	KW.	KW.	
1. Central Electric ..	26,283	7,570	—	
2. City of London ...	27,000	6,000	6,000	P.5
3. Clyde Valley ...	35,000	37,500	15,000	P.3
4. County of London	19,800	14,400	—	
5. Lancashire Elec.	16,500	6,000	—	
6. London Electric Supply	25,450	12,000	—	

Name of Company.	Plant capacity, at June 30, 1914.	Additional plant installed or authorised. Period, June 30, 1914, to Oct. 31, 1918.	Proportion of additional plant sanctioned by present director of electric power supply.	Graded
	KW.	KW.	KW.	
7. Mersey Power Co.	4,900	24,500	20,000	
8. Metropolitan ...	22,500	4,000	—	
9. Midland Electric	10,600	10,200	—	
10. Newcastle-on-Tyne and Assoc. Co.'s	86,200	114,200	25,000	P.3
11. North Metro. ...	16,122	21,068	6,000	P.4
12. Scottish Cent. ...	3,300	6,230	3,000	P.4
13. Shropshire, Worcs. and Staffs. ...	28,325	15,850	—	
14. South Metro. ...	6,000	15,000	5,000	P.4
15. Trafford	5,200	7,950	—	
16. Twickenham ...	1,180	4,000	2,000	P.4
17. Uxbridge & Dis.	1,030	3,650	2,000	P.4
18. Woking	1,100	1,000	—	
19. Yorkshire Elec.	14,500	12,000	—	
20. Slough & Datchet	695	1,335	1,000	
Totals	351,685	324,453	85,000	

(10 sanctions.)

WAGES TO EMPLOYÉS IN ELECTRICITY UNDERTAKINGS (LONDON DISTRICT).

Two awards have just been issued by the Committee on Production in respect of the above. The first, No. 2,772, refers to electricity undertakings (general) London district, and the second, No. 2,773, to electricity undertakings—railway companies operating in the London district. By the former award uniform basic rates and working conditions have been established for this section of the electrical industry. We are informed by Mr. W. J. Webb, London District Secretary of the Electrical Trades Union, that the basic rates are plus 23s. 6d. (28s. 6d. as from December 7th next), and plus 12½ per cent. on all wages earned.

The terms of reference to the committee were as follows:—

(*a*) Claim for the application to the workpeople concerned of the award of the Committee on Production of July 24th, 1918, for the engineering and foundry trades.

(*b*) Claim by the unions affected for new card rates and altered working conditions.

(*c*) A counter-claim by the executive committee of the conference of municipal undertakings on wages.

The matter was referred by the Ministry of Labour to the Committee on Production for settlement, and representatives of the parties were heard on August 19th and October 22nd, 1918. The parties to the reference were the I.M.E.A., representatives of municipalities and companies supplying electricity in the London district, and electric tramway authorities on the one hand; and the Electrical Trades Union, the National Union of General Workers, the Workers' Union, and the National Amalgamated Union of Enginemen, Firemen, Mechanics, Motor-men, and Electrical Workers. The committee issued an award on September 6th dealing with item (*a*) of the claim. As regards the new card rates and working conditions, the committee suggested to the parties at the hearing on August 19th, that this part of the claim should be the subject of a conference between representatives of the electricity undertakings affected, and the several trade unions, with a view to ascertaining to what extent an agreement could be arrived at thereon. It was agreed that this course should be adopted. In pursuance of this agreement several conferences between the parties took place, as the result of which a large measure of settlement was arrived at in regard to the various matters dealt with. Arising out of these discussions the parties intimated to the committee that they desired that any award which might ultimately be made, should not only deal with outstanding points, but should also confirm, if the committee deemed fit, the decisions come to by agreement on various matters. The committee in the present award, No. 2,772, gives effect to this request. The award of the committee is as follows:—

This award shall apply to the workpeople concerned who are employed in the electricity undertakings affected and who are engaged in the generation, transmission, and distribution of electrical energy and on the maintenance of plant and cables in connection therewith.

(I.) WORKING CONDITIONS.

The working conditions shall be those set forth below:—

(*a*) Shift Work.

Definition.—Shift-workers are employés who take alternate shifts, that is, "rotating shifts." They shall be regarded as weekly servants. Seven days' notice of termination of engagement shall be given on either side.

Hours of Labour.—Eight hours shall constitute a shift. Seven shifts (56 hours) shall constitute a week's work.

Overtime.—Time worked in addition to the normal shift, which includes change over, shall count as overtime.

Overtime shall be paid for as follows: First two hours ordinary time, afterwards time and a-half; if men are called in time and a-half shall be paid.

All overtime work shall be paid for on the basis of actual time worked after each shift, and not on the aggregate basis of a week's work.

Every man shall have eight hours off duty before commencing another shift when overtime is worked.

Holiday Pay.—The men concerned shall receive 14 days' holiday with pay after 12 months' service. Double time shall be paid for work on Christmas Day. Good Friday and Statutory Bank Holidays shall be paid for at ordinary rates.

(*b*) Day Work.

Hours of Labour.—The hours of labour shall remain as at present.

Overtime.—Each day shall stand by itself for the purpose of calculating overtime. The first two hours after the normal hours of the day have been worked shall be paid for at the rate of time and a-quarter, and time and a-half thereafter. Sunday work shall be paid for at the rate of double time.

If work continues after midnight the men shall be paid at the overtime rate until starting time next morning.

Men required to start before their usual starting time in the morning shall be paid at the rate of double time up to the usual starting time.

No man shall work more than 36 hours continuously, meal time included.

Holiday Pay.—All work done on Christmas Day and Good Friday shall be paid for at the rate of double time. All work done on Statutory Bank Holidays shall be paid for at the rate of time and a-half.

(*c*) Day or Shift Work.

Equal Rates for Men and Women.—Men and women shall be paid equal rates for equal work.

Charge Hands.—All charge hands shall receive a minimum of 1d. per hour extra.

Existing Rates.—Where existing rates are better than those provided for under this award, no change shall be made.

Dirty Work.—When men are required to work on flue cleaning or in accumulator chambers with acid or when blowing out plant by compressors, outside the ordinary sphere of their employment, they shall be paid 1s. per day or shift extra.

Holidays.—The holiday conditions of other than shift workers shall remain as at present except as herein provided.

Assistants and Probationers.—The following rates shall be paid to assistants under 21 years of age on generating station switchboards and in sub-stations:—For the learning period, 10s. per week first six months (probationary); 15s. per week second six months; 20s. per week third six months; afterwards, 75 per cent. of the minimum rate for the next 12 months, followed by an additional 5 per cent. on the rate per annum up to the age of 21. The number of probationers (learners) training on switchboards shall not exceed the number of sub-stations on the system, together with three per generating station. No probationer shall be employed on shift except under the control of the man in charge of the switchboard or sub-station.

Application of Conditions.—These conditions shall apply to all workers of 21 years of age and over, subject to the age reservation of 21 years not applying to unskilled labourers of 18 years or over who do not come under agreements as to probationary period of training.

(II.) BASIC RATES.

The following shall be the basic rates for the grades of employés set forth below:—

Grade.	*Rate.*	*Grade.*	*Rate.*
Electrical fitter / Electrician / Electrical wireman	10½d. hour.	Battery fitter	10½d. hour.
		Battery attendant ..	9d. ,,
		Conduit system:	
Jointer	9½d. ,,	Leading hands.. ..	8½d. ,,
Plumber jointer ..	1s. ,,	Cable hands	7½d. ,,
Armature winder.. ..	10½d. ,,	Fitter's mate	8d. ,,
Mains foreman	60s. week.	Wireman's mate	8d. ,,
Cable ganger	10d. hour.	Electrician's mate ..	8d. ,,
Pub. litg. foreman ..	10d. ,,	Jointer's mate	8d. ,,
Pub. litg. leading hand..	9½d. ,,	Telephone electrician ..	10½d. ,,
Pub. litg. attendant ..	8d. ,,	Telephone linesman ..	9½d. ,,
Arc lamp trimmer ..	8½d. ,,	Telephone operator ..	30s. week.
Installation inspector ..	55s. week.	Boiler cleaner (inc. rate)	8½d. hour.
Meter insp. and tester ..	10½d. hour.	Labourers, indoor ..	7½d. ,,
Meter repairer (mech'an)	11d. ,,	Labourers, outdoor ..	7½d. ,,
Meter fixer..	8½d. ,,	Cleaner	7d. ,,
Meter reader	8d. ,,	Ash hopper, convey. men	8½d. ,,
Overhead linesman (skld)	9½d. ,,	Coal handling (not trim.)	8d. ,,
Storekeeper (stk. ledgers)	50s. week.	Coal weigher (not weigh-bridge clerk)	8d. ,,
Storekeeper	40s. ,,	Shunters and tippers ..	8d. ,,
Assistant storekeeper ..	8d. hour.	Gatekeeper	30s. week.
Tool storekeeper (skld.)	50s. week.		

Operative Staff.—Power House.

Switchboard attendant up to 5,000 kw. installed	50s. week.	Assistant driver .. / Turbine attendant / Pump attendant / Water-softening plant attendant	8½d. hour.
Above 5,000 kw. installed	60s. ,,		
Assist. ditto or regulator up to 5,000 kw. installed	35s. ,,		
Ditto above ditto ..	40s. ,,	Greaser .. .. / Aux. plant attendant	8d. ,,
Fitter driver	11d. hour.		
Driver	9½d. ,,		

Operative Staff—Boiler House.

Leading stoker, 10½d. per hour; stoker, 9d. per hour; trimmer, 8d. per hour.

Operative Staff—Sub-station.

Rotary Sub-stations.—Sub-station inspector, 5s. per week above highest rate paid to the attendants at sub-stations under inspection.

Sub-station charge engineer or sub-station attendant:—

Under 1,000 kw. installed, 40s. per week; under 3,000 kw. installed, 50s. per week; 3,000 kw. and over, 60s. per week; subject to an additional 5s. per week being paid when any or all of the following conditions apply:—

(*a*) Sub-stations which are supplied from two or more generating stations in which attendants in charge have to synchronise or parallel such generating stations.

(*b*) Sub-stations where the attendants in charge are responsible for the area supplied from sub-stations and have to isolate sections of the network external to sub-stations in case any mishap occurs.

Assistant sub-station attendants:—

Under 3,000 kw. installed, 35s. per week; over 3,000 kw. installed, 40s. per week.

In assessing the kilowatts installed in a rotary sub-station, the following matters shall be taken into consideration:—

1. The battery capacity to be included as part of the sub-station equipment on the following basis:—

Traction Supply.—One-hour rate of discharge.

General Supply.—Three-hour rate of discharge.

2. Where both rotary and static machinery is in use in one sub-station the capacity of both shall be taken as the basis of rotary kw.'s installed subject to the static transformers forming part of the rotary equipment being excluded.

Grade.—Static Sub-stations—Sub-station Attendants.—All sizes under 2,000 kw., 40s. per week; all sizes over 2,000 kw., 45s. per week.

Where workmen other than those referred to in the above clause are employed and governed by other recognised trade union rates and agreements, such rates shall be paid. This understanding shall cover the following grades:—Mechanical fitter, boiler smith, boiler fitter, driller, hammerman, crane driver, lorry driver, bricklayer's mate, carpenter's mate, navvies, scaffolders, timbermen.

(III.) GENERAL.

It was stated at the hearing on behalf of the electricity undertakings that a very large proportion of their officials belonged to another trade union known as the Electrical Power Engineers' Association. In the case of the shift or charge engineers, it was stated that 174 out of 196 belonged to the latter union. It appears that the E.P.E.A. is at present considering the submission of a claim with respect to the rates of pay of its members. The suggestion was made to the Electrical Trades Union that representatives of the two organisations should meet with a view to arriving at a line of demarcation in regard to their respective membership, but this proposal was not agreed to by the E.T.U. The committee has very carefully considered the matter, and in view of the fact, which does not appear to be in dispute, that a great proportion of these officials belong to an organisation which was not represented at the hearing, it feels a serious difficulty in attempting to determine the rates of pay of the officials. The committee has accordingly come to the conclusion, and it so finds, that in the absence of a substantial representation of the section of the employés affected by this part of the claim, no alteration shall at present be made in the existing rates. It appears to the committee to be desirable that in the first instance this question should be discussed between the organisation which represents a great majority of the men involved and the undertakings themselves.

The question was raised at the hearing on October 22nd of the definition of the London district, to which any award which might be made should apply. It was suggested by the unions that this should be an area covered by a radius of 20 miles from Charing Cross. The adoption of this proposal would have the effect of including undertakings not covered by the present reference. The committee's decision is that the claim under this head has not been established.

The question was raised on behalf of the suburban undertakings that, in view of the different conditions obtaining in the districts concerned, special rates should be fixed on a lower basis than that adopted in the case of the undertakings in the central area. After careful consideration, the committee has decided that no distinction shall be drawn in this respect so far as regards the undertakings included in the reference.

At the conference which took place between the parties the question was raised as to the establishment of machinery for dealing with certain questions which might arise in the future, and it was understood that an arrangement on the following lines was agreed upon:—

Pending the setting up of district boards under the proposed Joint Industrial Council for the Electric Supply Industry, it is proposed that if any questions arise with regard to:—

1. The intent and application of any award of the Committee on Production,
2. Rates for additional grades,
3. Regrading,
4. General questions,

the parties shall confer after requisite notice has been given and endeavour to arrive at a mutual settlement. Failing such settlement, any matters of difference to be referred to the Committee on Production.

RAILWAY COMPANIES.

The second award, No. 2,773, refers to electricity undertakings—railway companies operating in the London district. The parties to the reference were the Railway Executive Committee on the one hand, and the four Trade Unions above mentioned on the other. The claim submitted by the unions concerned was for the establishment of new card rates and altered working conditions. The committee in this award deals both with the matters that were agreed upon by the parties and those which have been decided by the committee.

The award applies to employés solely engaged in electricity generating stations and sub-stations and on high tension cables between generating stations and sub-stations. The working conditions and the application of the award are the same as those set out in the first award, No. 2,772. The award reads:—

The committee in its award, No. 2,772, of this date with respect to general electricity undertakings in the London area, prescribes the basic rates to be observed in respect of a large number of grades of employés concerned in the working of such undertakings. The large majority of such rates were agreed upon between the parties at conferences which took place prior to the hearing on October 22nd of the application of the unions with respect both to the general undertakings and the railway undertakings. The question of rates was also the subject of discussion between the representatives of the railway companies and of the unions at different conferences, but no agreement was arrived at, as the companies were not prepared to agree to the uniform adoption of similar rates to those obtaining in general electricity undertakings. The general question of the principle involved in this matter, namely, the payment to tradesmen in the employment of railway companies of the same rates as obtain for similar classes of workpeople in employment outside the railways has been the subject of discussion between the various railway companies and the representatives of their workpeople for a long time past, both before and since the outbreak of war. It has also been the subject of reference from time to time to the committee. On all occasions upon which the matter has been brought forward the railway companies have submitted that the advantages of railway employment in the shape of greater continuity of service, cheap travelling facilities, and similar matters, and the special statutory position the companies occupy, justify a distinction being drawn between the rates to be paid. These same arguments were advanced by the railway companies in opposing the present claim. The committee gathered that when the matter was discussed at the conference between the parties, the railway companies expressed their willingness to make certain adjustment of rates. Having very carefully considered the matter, the committee has come to the conclusion that it would not be justified at the present time in disturbing a long-standing and pre-war practice by conceding the principle of the payment of the same rates to the employés here concerned as obtain in the case of electricity undertakings proper.

The award of the committee with respect to this part of the claim is as follows:—

1. That the claim for the payment to the employés of the railway companies concerned in the present application of the same rates of wages as obtain in the case of the general electricity undertakings in the London area is not established.

2. This decision is without prejudice to the matter being further discussed between the parties with a view to such readjustments in rates being agreed upon as may be necessary having regard to the special conditions of railway employment.

Both awards take effect as from the beginning of the first full pay after August 19th, 1918, and are signed by William W. Mackenzie, J. Duncan Elliott, and F. S. Button, and dated November 8th, 1918, H. J. Wilson being the secretary, at 5, Old Palace Yard, S.W. 1.

CORRESPONDENCE.

Letters received by us after 5 p.m. on Tuesday cannot appear until the following week. Correspondents should forward their communications at the earliest possible moment. No letter can be published unless we have the writer's name and address in our possession.

"Fraternity"—or Tyranny?

As one having an enthusiastic interest in the well-being of mortals who work for their living, especially in the electrical industry, I venture to ask you to insert the following comments *re* the remarks put forward in the letters of Brother Webb and Mr. John Vincent, in your issues of October 25th and November 1st.

In the first instance, the idea Brother Webb has instituted, in possibly approaching other trade union secretaries to inquire into the E.P.E.A.'s credentials, is an excellent one, and should prove a great factor in somewhat clearing the air, and, further, I sincerely hope Brother Webb will allow these remarks to be a notice to other doubtful secretaries to do likewise, and would remind Brother Webb that once upon a time a certain man called a trained body of men "A Con-

temptible Army." Historical instances, however, have a habit of repeating themelves, with the all too well-known *finale*.

In regard to Mr. Vincent's letter in your issue of November 1st, I believe I am correct in stating that the A.E.S.E. was resuscitated for obvious reasons by far-seeing men, the majority of whom were not members of the existing A.E.S.E., but who saw the need of an organisation for their particular class, which they, as everyone, have every right to do without question.

I think, therefore, that Brother Webb should appreciate the fact that a body of educated men (forming the nucleus of the future chiefs), who admittedly control the destinies, to a very large extent, of the members of his association, have organised themselves to better their conditions in a manner they consider compatible with their position, and which organisation has saved him the worry and trouble.

Therefore, I would ask Brother Webb to kindly allow those who, in the majority of cases, have had to fight hard for the position they now hold the credit of being able to insist as a body that their demand for better conditions be acceded to.

E. Napier Christmas.

Highbury, N. 5, *November 12th*, 1918.

I think "Unity's" suggestion a good one. However, I presume both the E.P.E.A. and the E.T.U. would consider it beneath their dignity to approach each other. I suggest that you, Mr. Editor, should invite both sides to meet. To any unbiased person it is obvious that there is ample room for both, as it is just as undesirable that an engineer should belong to a mechanic's trade union as it is that a mechanic should belong to an engineer's association, but there is no earthly reason why their aims should clash.

Borough Electrical Engineer.

November 9th, 1918.

[The suggestion that both sides should meet has already been made by us on p. 362 of our issue of October 18th, 1918.—Eds. Elec. Rev.]

In a technical journal it ought to be unnecessary, but for the purpose of my letter it may be as well to point out that during the four years of war the electrical industry has leaped forward at a rate of development which pre-war methods of advertising had not effected in 30 years.

"Electric power is so necessary to industry and comfort that it must be taken in hand." This invaluable publicity from the lips of the Prime Minister of England on Saturday last.

For the purposes of increased productivity, to make good the material losses of the country, it is necessary that all sections—employers, management, and workers—should extend themselves to ensure that this most important factor, the electrical industry, is organised and ready for service at the highest efficiency.

There should be unanimity of effort, as it is true that the success of those engaged in any industry can follow only on the success of that industry. There are hopes that by the new councils set up, no section will be permitted to take unfair advantage over another.

It is to be regretted that in the floodtide of success there should be troubled water. Some electrical workers are threatening to take drastic action if within a specified time certain engineers do not join the E.T.U. in preference to the E.P.E.A. Such pettiness ought not to be.

If these incidents, which have occurred in the provinces and now are happening in the Metropolis, are merely guerrilla actions of irresponsibles, it is the duty of the governing body of the E.T.U. to end them; if they are the considered stratagem of those in authority, then it would be well for them to reconsider if such coercive tactics are likely to advantage the industry and the members of their union. It may be made public now that no member of the E.P.E.A. will be intimidated into joining the E.T.U. If the Bolshevist methods continue, and it were somehow to occur, which is surely unlikely, that these had any authoritative support, the members of the E.P.E.A. would oppose it to the utmost of their power. The time has come for peace.

Both the E.P.E.A. and the E.T.U. have their utility, their line of demarcation is clear, and their co-existence ought not to turn either aside from the main purpose of its existence.

W. Arthur Jones,
Hon. General Secretary,
Electrical Power Engineers' Association.

London, S.W., *November 19th*, 1918.

[We cannot but regard the action attributed to the members of the Electrical Trades Union with profound regret; at a time when co-operative effort and fraternal harmony are most necessary to the progress of the industry, it is most unfortunate that discord should be accentuated, and we trust that calmer counsels will prevail. It is, of course, unthinkable that a nation which, at the cost of immense sacrifices, has just succeeded in securing the freedom of the world would sanction the destruction of individual liberty which is implied by the policy in question.—Eds. Elec. Rev.]

The E.P.E.A. and the Electrical Industry.

After the manner in which the E.P.E.A. has been trumpeting abroad their many virtues as representing all classes of electrical engineers, I think the following facts should be given as wide publicity. In spite of the E.P.E.A.'s assertion that they represented the electrical industry when they were out to smash the A.B.E.E. they are now purely representative of electric supply only. They have now repudiated representation of manufacturing electrical engineers.

This is a vital point for those engineers who have already joined the E.P.E.A., and others who are now not represented by any other association covering the electrical industry. The A.B.E.E. whom the E.P.E.A. considered superfluous did have a manufacturing section as well as supply. Now, having exploited the electrical manufacturing engineers to gain their points, the E.P.E.A. have reverted to the narrow limits of their old title of A.E.S.E. In effect E.P.E.A. is camouflage for A.E.S.E.

Camouflage.

November 18th, 1918.

Work Without Pay.

In the main I agree with Mr. Hewlett. I have nothing to complain of with regard to courtesy and sympathy from the heads of the Coal Mines Department, with whom I have come in touch. I know Mr. Wilson personally, and have a great respect for him.

When I was asked to act as district engineer on a voluntary basis, I was pleased to do so, as I considered the work would be in the national interest; and I shall still do the work to the best of my ability.

However, I still adhere to my opinion that if the transport officers and fuel overseers are paid, the district engineers should be treated in the same manner.

As regards the remarks of "District Engineer No. 2," I certainly knew on what terms my services were to be rendered, but I did not know at the time that road transport officers and fuel overseers were to be appointed on entirely different terms.

Also, I served in the South African war as a volunteer, and, therefore, it is hardly fair to put me in the same category as those who desire to make capital out of their country's trouble.

District Engineer.

November 8th, 1918.

Smooth versus Undercut Commutators.

In common with your correspondent, Mr. C. S. Buyers, I also was interested in the article mentioned, and consider a smooth commutator, with the treatment given, the best solution of a rather unique problem. With machines which can be stopped, say, once a month, however, undercutting possesses important advantages. My experience has been that undercutting is almost a cure-all for troublesome commutators. The chief precautions are: Don't cut deep; don't leave high mica on either side of cutting tool, *i.e.*, cut the full width; examine closely to see that this is done, as it is illusive. With these precautions a commutator will run for weeks without attention. When sufficiently skilled labour is available, an occasional dab with a clean linen rag is an advantage. I have had a number of dynamos and motors under my care, including both "prehistoric" and modern, and have never had one which did not yield to the above treatment. I have never used abrasives on the commutator.

L. Bradburn.

Ashton-under-Lyne, *November 16th*, 1918.

With reference to the correspondence on the above subject, our experience is that smooth commutators are more satisfactory than undercut commutators, as we find that the latter become choked with carbon and copper dust, and cause short circuiting, as mentioned by Mr. Buyers. Moreover, we find that motors with undercut commutators are more noisy than motors having smooth commutators, the undercutting of the commutator producing a distinct hum.

We also find that commutators built up with pure mica are more satisfactory than those in which built-up mica plates are used. It is, no doubt, cheaper to use built-up mica plates, as the latter can be purchased to any desired gauge, and of uniform thickness, while pure mica has to be split and carefully gauged by hand. We find, however, that with built-up mica insulation, the heat generated in the commutator, and the sparking, cause the resinous matter in the built-up mica to carbonise, with the result that short-circuiting takes place between the bars of the commutator.

We would suggest that makers of the various brands of micanite should look into this matter, and endeavour to produce a built-up plate which will not carbonise through any heating or sparking.

E. P. Allam & Co.
E. P. Allam.

London, W.C., *November 18th*, 1918.

In your issue of the 15th inst., C. S. Buyers wishes for views of those who have experienced trouble with undercut or smooth commutators; perhaps the following may be of interest to some of your readers. In my experience with D.C. machines I have had both smooth and undercut commutators to deal with, and I must say that the former have always given more satisfaction.

In the case of smooth commutators, the mica was always examined after an appreciably long run, and if found higher than the segments, it was carefully trimmed down to the level of the commutator. This I found the most satisfactory way of getting good commutation.

In the case of undercut commutators I have always experienced trouble and difficulty in avoiding sparking and overheating of the armature. When the mica is cut down—even 1/16 or ⅛ of an inch—the space between the segments cannot be kept perfectly free from carbon and copper dust; and if oil from the bearings happens to get between the segments, with the carbon and copper dust, it would short-circuit the armature coils.

To quote an actual case. The exciter of an alternator had the mica cut down to about ⅛ in., the armature was found to get very warm, and on one occasion several coils were unsweated at the lugs. The brushes were kept well trimmed, but sparking could not be avoided, and after a day's run the brushes were found to be chipped in various places. In time, owing to continual sparking, pits formed on the commutator, and the edges of the segments became rough and worn; the former were continually being filled with commutator cement, which gave very unsatisfactory results, and the latter could not easily be remedied, and thus difficulty was always experienced in exciting the field of the A.C. machine. Had the mica been kept trimmed with the commutator this trouble would probably have been avoided, and more satisfactory results obtained.

C. C. Sleigh.

West Kensington, *November 18th*, 1918.

LEGAL.

Barlow Bros. v. Thomas & Regas.

Mr. Muir Mackenzie, High Court Official Referee, on Monday, Nov. 18th, heard an action in which Messrs. Barlow Bros., electrical engineers and fitters, of Brunswick Road, City Road, sought to recover from Messrs. Thomas & Regas the sum of £105 10s. 8d. for work done and materials supplied in connection with the erection of a skin-dressing plant.

Mr. Lort Williams appeared for the plaintiffs; the defendants, although they had put in a plea of contract, did not appear, and the case was consequently taken as an undefended action.

Counsel for the plaintiffs said that the defendants had admitted indebtedness to the amount of £58, which they said was the contract price, and the only issue was whether there was a contract or not. A portion of the balance of the claim was for electrical work done by the plaintiffs to defendants' orders, which had nothing whatever to do with the original work which the plaintiffs were engaged to do, which had relation to the erection of the skin-dressing plant only, and as to which judgment had already been obtained under order 14. The plaintiffs' case was that there was no contract for any fixed sum, and that the price charged for the work which they had done was fair and reasonable.

Mr. H. M. Harris, manager to Messrs. Barlow Bros., proved having received an order from the defendants to fix up the skin-dressing plant, and said that there was no agreement as to the price at which the work should be done, nor was there any contract. While the work was being proceeded with the defendants gave an order to repair the motor for the plant and connect it with the new plant. That work was done, and the charge for it was £29 4s. 9d. They also did work in connection with the lighting of the premises for which £9 10s. and £8 10s. 6d. were claimed. That work was also outside the original order. The whole of the work was done under his supervision, and the prices charged were fair and reasonable.

The Official Referee, in giving judgment for the plaintiffs for the amount claimed (£105 10s. 3d.), with costs, said that as the plaintiffs had already been paid £58 execution would be limited to the balance of £47 10s. 3d., and the costs would be on the High Court scale.

Judgment was entered accordingly.

SOUTH SHIELDS ELECTRICITY SUPPLY.

The future of the electrical undertaking was discussed at the South Shields Council on November 4th under the chairmanship of the Mayor (Ald. Wm. Allon). The electrical committee reported at length on the subject of the power supply and the correspondence and negotiations with Mr. W. B. Gridley, Director of the Electric Power Supply, on the question of the extension of plant and the proposal for the Corporation to take bulk supply from the Newcastle Electric Supply Co.

Ald. Henderson, chairman of the Electrical Committee, moving the adoption of the report, referred to the proposal to install new plant and make alterations to the old to increase its capacity, and to the efforts of the borough electrical engineer to get the sanction of the Ministry of Munitions and the Local Government Board to borrow the money. Those two bodies made it quite clear that before anything could be done it would be necessary to obtain the approval of the Director of Electric Power Supply.

Both Col. McLellan and Mr. Gridley contended that the Corporation should endeavour to purchase a supply of electricity rather than install additional plant. Ultimately a quotation by the N.E.S. Co. on a sliding scale basis was duly considered. The committee was not satisfied; it would have had to pay the company more per unit than it would have cost the Corporation to generate it. The deputation appointed by the Council waited on the Director of Electric Power Supply, who, however, maintained that the Corporation had not established its case, and that it should endeavour to come to terms with the supply company. The N.E.S. Co. later agreed to enter into a short-period agreement, and to supply energy at a figure 10 per cent. below the Corporation's own generating costs, but on condition that the Corporation paid for the cost of extending a cable, and that it should install the necessary converting plant. There was nothing to be gained so far as the Corporation was concerned by such an arrangement, and the committee turned it down, as the plant, involving an expenditure of nearly £10,000, would be of no use to the undertaking at the end of the period of agreement. Mr. Gridley was urged, under the circumstances, further to consider the proposal to install new plant. He replied that the case had been presented to the Electrical Service Committee—a committee recently set up by the War Priorities Committee—and after full consideration it had decided that it would not be desirable further to extend the generating station at the moment, and that the arrangements for taking a bulk supply should be completed.

As a result of further interviews, permission was given the Corporation to install at least one new boiler to enable the steam plant to be run satisfactorily, at a cost of £7,500, "subject to terms being completed for purchasing the bulk supply recently under consideration." The advantage which the Corporation would get from this arrangement would be 1,000 kw., which would have cost £17 per kw. On the other hand, had the Corporation installed its own plant entirely at a cost of £40,000, it would have had available 3,000 kw., the average price of which worked out at £13 per kw.

The committee's report was adopted, and it was resolved: "That the Council be recommended to decline to fall in with the decision of the Director of Electric Power Supply, which will have the effect of forcing the Corporation to take a supply of electricity from a private company having a monopoly of supply in the adjoining area, being of opinion that such a course would be unfair and prejudicial to this municipality which has supplied electricity in South Shields for 22 years to the satisfaction of the public, and particularly in view of the recent findings of the Departmental Committees and the possible proceedings arising thereout, and they recommend the Council to authorise this committee to take every possible step to obtain the sanction of the Government departments to the necessary extension of plant to meet the demands for electricity."

BUSINESS NOTES.

The F.B.I. War Congratulations.—The following very felicitously expressed congratulatory war messages from the F.B.I., sent on November 13th, are self-explanatory :—

The members of the Federation of British Industries representing the great body of the manufacturers of this country, desire to offer to His Majesty the King their respectful homage and congratulations upon the wonderful success which has crowned the efforts of the British Empire and her Allies in the struggle which has been brought to such a glorious conclusion.

The members of the Federation of British Industries desire to offer to the Forces of the Crown of all three services, and from every part of the Empire, profound appreciation and thanks for the superb courage and endurance with which they have borne the terrible trials of the past four years.

The members of the Federation of British Industries tender to the Right Honourable D. Lloyd George, the Prime Minister, an expression of their sincere admiration and thanks for the magnificent courage, steadfastness of purpose, energy, and skill with which he has guided the Nation through years of the gravest difficulty and anxiety to final victory.

The members of the Federation of British Industries desire to express their sincere and hearty appreciation, which is based upon actual knowledge and experience, of the loyal and devoted service which has been given by the staffs and workpeople of the manufacturing and business establishments of this country throughout the period of hostilities, which has contributed in such great measure to the success of the Allied cause.

Munitions Orders Revoked.—The Minister of Munitions has issued an Order revoking the Order of December 12th, 1917, prohibiting the employment of certain classes of munition workers. The Machine Tools, &c., Orders of August 28th, 1916, June 5th, 1917, and April 15th, 1918, have also been revoked so far as they relate to second-hand articles.

Import Prohibitions Removed.—In the *Board of Trade Journal* for November 14th will be found a lengthy list of articles for which a general licence to permit of importation has been issued.

Trading with the Enemy.—The *London Gazette* for November 15th contains further additions to the lists of persons and bodies in the following countries with whom trading is prohibited:—Argentina, Brazil, Chile, Cuba, Denmark, Mexico, Morocco, Netherlands, Netherland East Indies, Spain, Venezuela.

A Swedish Consolidation.—It is reported from Stockholm that the Allmäna Svenska Elektricitäts A.B. are proposing to absorb their subsidiary companies, and to raise their share capital for this purpose by £1,373,000, thus bringing the total to £3,571,000.

The A.E.G. and the Ukraine.—The A.E.G., of Berlin, has registered in that city a company, under the title of the Ukrainische Allgemeine Elektrizitäts G.m.b.H., of Berlin, with a share capital of £15,000.

New Works in Spain.—Our Spanish correspondent says that Messrs. Pirelli have under consideration the construction of a factory in Bilbao for the manufacture of all kinds of rubber and asbestos packing.

For Sale.—Redditch Corporation has for disposal a Babcock & Wilcox boiler, working pressure 160 lb., with a Foster superheater. Particulars are given in our advertisement pages to-day.

Catalogues Wanted.—A correspondent—Lieut. Swinford-Harrison, O.C. Workshops, 1019, M.T. Co., Mesopotamia—asks for catalogues of wireless apparatus and sets (to work with 3-KW. dynamo, 110 volts); catalogues of dynamos, suitable to be driven by belt, from 30-35 H.P. lorry engine (petrol); catalogues of bells and fittings; catalogues of portable and intercommunicating telephones and fittings.

Auction Sale.—MESSRS. DEBENHAM, STORR & Co. will sell by auction, on November 29th, at King Street, Covent Garden, by order and account of the Marshal of the Admiralty, a large quantity of miscellaneous goods, including about 50 dozen electric globes, &c. See advertisement pages to-day.

American Reconstruction.—The financial correspondent of the *Daily Telegraph* at New York says that the U.S. Government is making every effort to prepare a careful programme of reconstruction which will avoid economic and industrial depression, and it seems likely that a Commission will be appointed to guide the nation's conversion from war to peace. Officials are convinced that so long as the transition is gradual, factories and the workers engaged in war production can be diverted to constructive industries without much disturbance. As an instance of the trade boom ahead, it is mentioned that France alone will require 10,000,000 tons of structural steel from America.

Steel Makers' Restrictions Eased.—The Ministry of Munitions announces that, until further notice, iron and steel makers are at liberty to accept and execute orders for iron and steel ranking for priority below Class B, subject only to conditions shortly to be issued, as regards prices, and to the Order as to priority dated March 8th, 1917. For this purpose the operation of such clauses of the Control of Steel Supplies Order of November 20th, 1915 (as amended by Order of December 4th, 1917), as prohibit the manufacture of iron and steel for orders ranging below Class B, is suspended.

Co-operative Export Trade.—Like most of our great trades, the section dealing with hardware has suffered a heavy loss in exportation during the last few years. And probably, like others, it will only be revived by means of very special efforts. One scheme that has been prepared by Mr. G. W. Goodchild, of Eagle Street, Southampton Row, London, W.C., now lies before us. It is based on the principle of co-operation in the reorganisation of tool and cutlery exports, and involves the formation of an export association amongst those in the trade, under the leadership of a firm of merchants having the necessary experience of international trade, markets and finance, without being manufacturers, and thus, as the pamphlet before us says, "unavoidably more or less biased." Sample exhibitions in all industrial and trade centres in certain territories, the holding of local stocks, the appointment of general agents, and the opening of a London headquarters, are all parts of the project which it is proposed to develop as a self-supporting undertaking, managed by Mr. Goodchild on a percentage-profit basis.

Catalogues and Lists.—THE "Z" ELECTRIC LAMP MANUFACTURING CO., LTD., Southfields, London, S.W. 18.—Price stock list (in folder) of their accessories and lighting sundries—adaptors, battery material, bell pusher and wire, ceiling roses, lampholders, fans, fires, shades, switches, pocket lamp material, and various other lines. The folder is for permanent use, as revised editions of the list are to be issued monthly.

THE B.E. CO. (OF LONDON AND BIRMINGHAM), LTD., Mansion House Chambers, London, E.C. 4.—Illustrated price leaflet of the "Beco" combination electric radiator and stove (convertible), and of "Hendon" drawn-wire lamps.

MESSRS. HIGGS BROS., Summer Hill Street, Birmingham.—Stock list, with prices, of shunt-wound motors.

Dr. Addison's Speech on Raw Materials and the National Factories.—In the course of his speech in the House of Commons on November 12th, the Minister of Reconstruction said that he estimated war stores would probably realise about £500,000,000. The Shipping Controller, who was in touch with the work of supplies of raw material, had prepared a tonnage programme which, he believed, was already in operation. The Controller hoped to issue in about ten days' time a revised freight rate (*ex* war risk), which was very necessary to give security. The tonnage programme was drawn up on essential raw materials exclusively; he was not speaking of luxuries.

"The country will desire to know at the present juncture what stocks of raw material are available for peace production, and what preparation has been made to supplement these stocks by importation during the difficult year that lies before us. I will deal first with metals, especially those which are most vital to our industrial welfare—namely, iron ore, pig-iron, and steel. There has been a great increase in our capacity for the utilisation of home ore, and arrangements are being made by the Shipping Controller which will render it possible to import as large a quantity of foreign ore as was imported prior to the war. It is proposed to release iron and steel forthwith. The difficulties which may arise owing to the fact that through the exigencies of war the price of steel now stands at an artificial level have not been overlooked, and it is intended to continue Orders fixing for a period a maximum price for steel, though this may involve continuing some measure of Government assistance for that period."

With regard to other metals, there was a sufficient supply available to render it possible to release some from control now, and nearly all the rest within six months. "I am convinced after a close survey of the position that we shall be able to meet the demands which reconstruction will make on our resources. But while I am satisfied that there will be enough for all if it is equitably divided, there must be no selfish attempts on the part of individuals to secure more than their share, and for this purpose it may be necessary to take precautions against hoarding."

As to the question of national factories, he had often been asked what the Government were going to do with them after the war. A number were entirely State-owned, others were partially State-owned, and there were a large number of which the firms were really the owners. There were 115 of this class. Then there were 25 factories serviceable for storage purposes. The conditions had been carefully examined, and in the case of certain factories it had been determined that it would be injudicious either to part with them or substantially alter them. As to factories which were considered redundant, offers for their utilisation would be received. A great group had been reserved for storage purposes.

A great opportunity presented itself before British traders, an opportunity which he hoped would be grasped by improved organisation among themselves. There was vast room for it. But all their efforts would be in vain; they could plan as they liked in regard to demobilisation, the disposal of stores, and the allocation of orders and other matters, but if they had not industrial peace all their efforts would be in vain. He had explored the various avenues of approach to industrial peace, and many of them ended in a blind alley. They would not get industrial peace by any Government restrictions. It was suggested that they should have a great meeting of Labour leaders and employers to see if they could not evolve some plan. All his advisers were of opinion that it was no good to proceed that way. It would be a Babel. The interests of one trade were different from those of another, and they could not settle them all on a single plan. What they had to do was to strive to get organisation in the industry, authoritative and representative, which would be able to settle these things for themselves. That was why they had set up the Joint Industrial Councils.

Demobilisation.—It is announced that inquiries regarding priority of release of officers and men in the Army should be addressed to the Demobilisation and Resettlement Department of the Ministry of Labour, 6, Whitehall Gardens, London, S.W.1, and not to the Admiralty, War Office, or other Department. The Admiralty, War Office, and Air Ministry will continue to deal with individual applications for the release of officers and men on compassionate grounds.

The War Office is anxious that it should be generally understood that the military situation does not yet admit of the commencement of demobilisation of the Military Forces, and that, consequently, until further notice, releases from military service can only be granted on compassionate grounds as hitherto, and in a limited number of special cases, where particular persons or classes are urgently required for the purpose of reconstructing industrial conditions preparatory to demobilisation. The responsibility for dealing with all applications in the latter class of case rests with the Ministry of Labour.

Exports to China.—The *London Gazette* for Nov. 19th contains a further list of persons or bodies to whom exports to China may be consigned.

Non-Ferrous Metal Industry Act.—A further list of those to whom licences have been granted appears in the *London Gazette* for November 19th.

Wage Advance.—In view of the increase in the cost of living since July, the Committee on Production has made further awards to the engineering and shipbuilding trades, chemical trade, heating and domestic engineers, railway shopmen, and Mersey ship repairing trades. The new award comes into force the week ending December 7th. Men over 18 are to receive a further advance of 5s. a week, and boys under 18 2s. 6d. a week.

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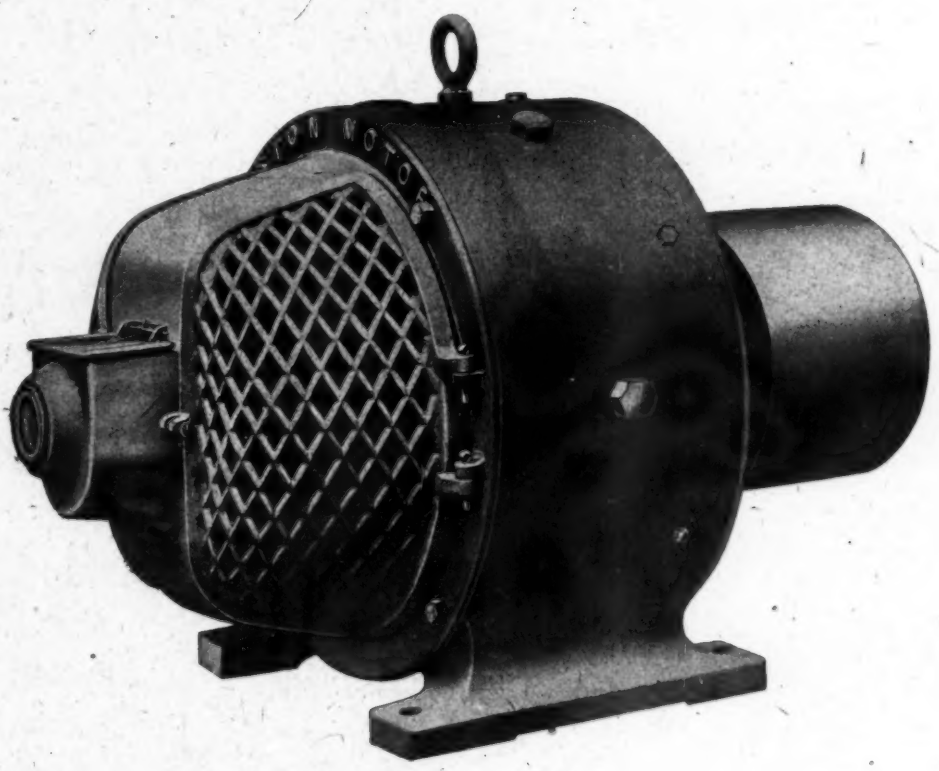

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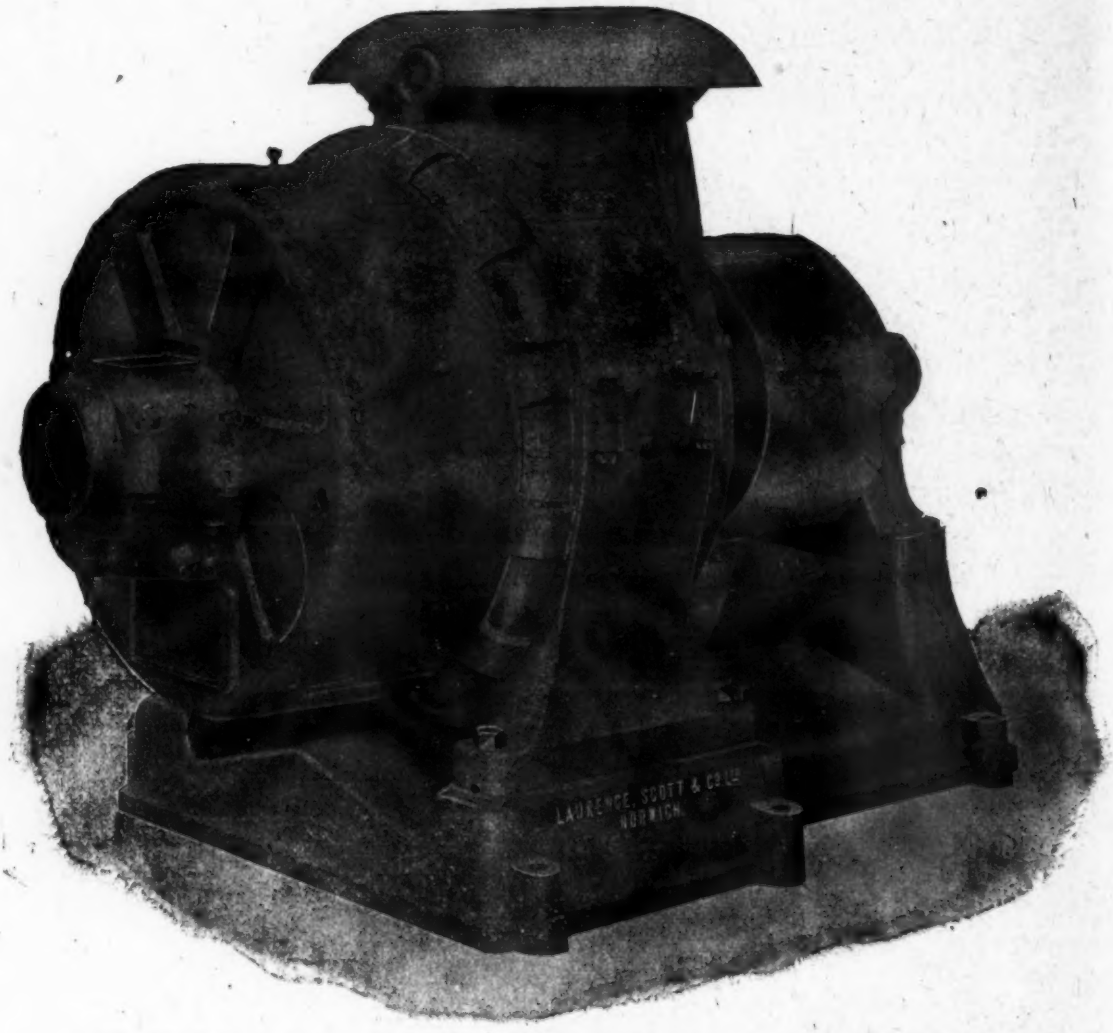

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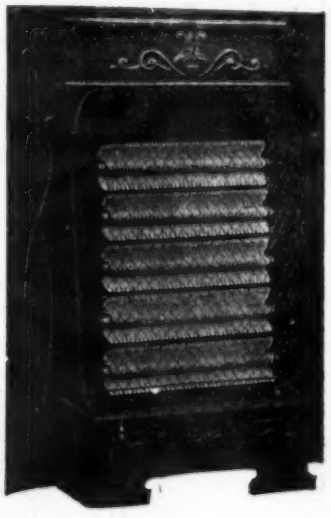

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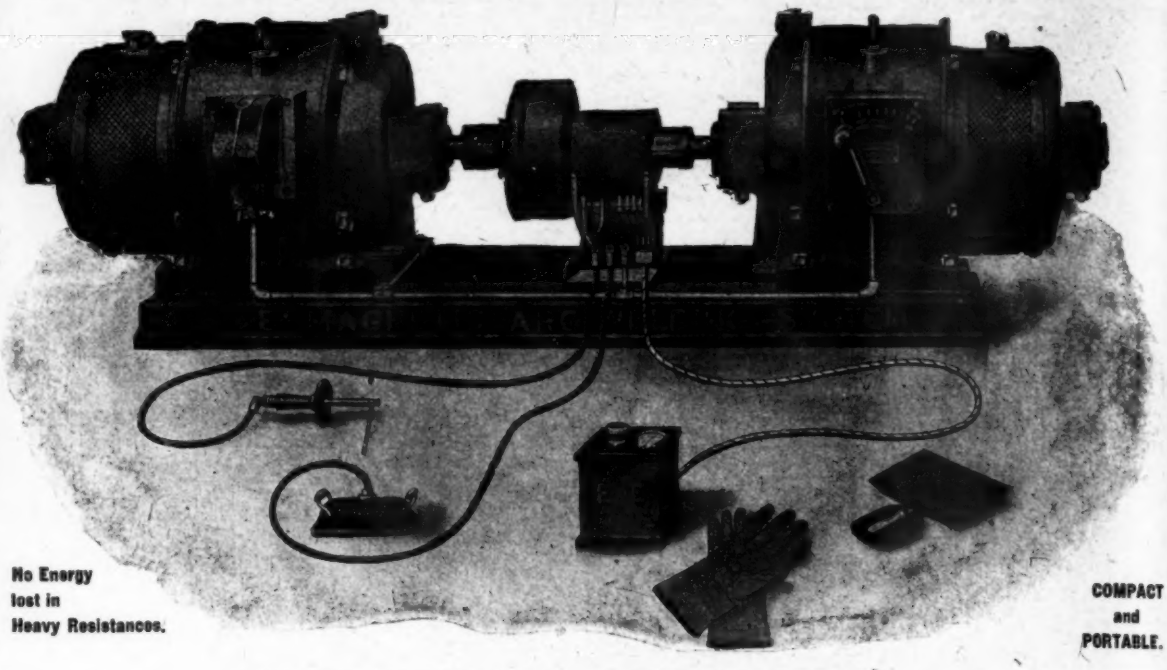

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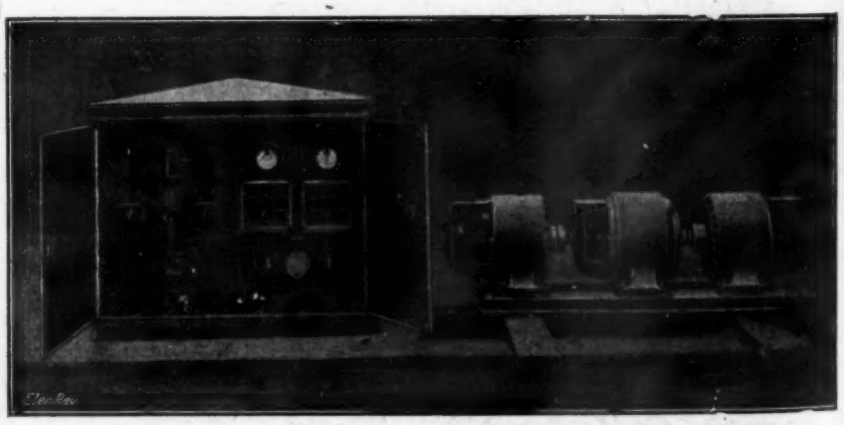

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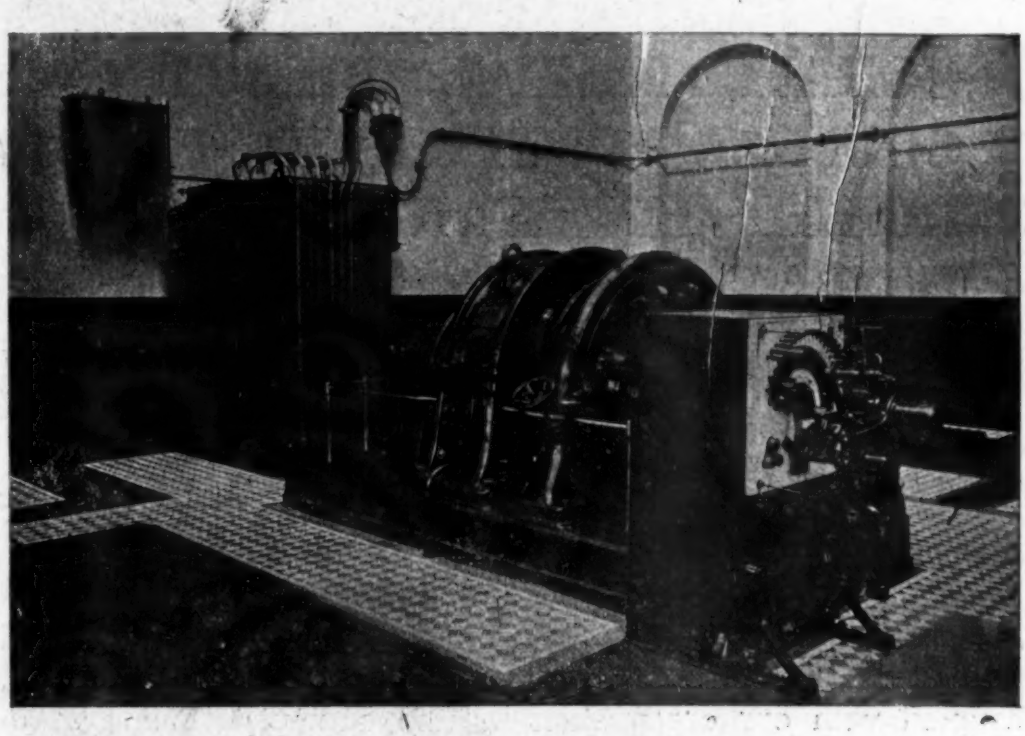

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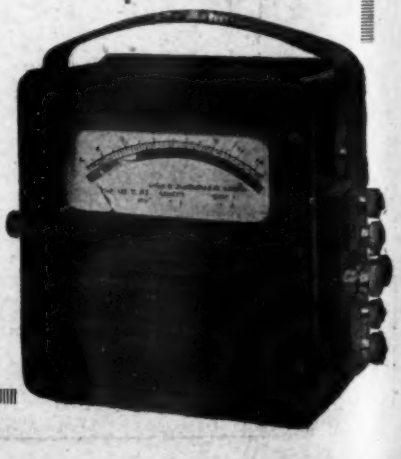

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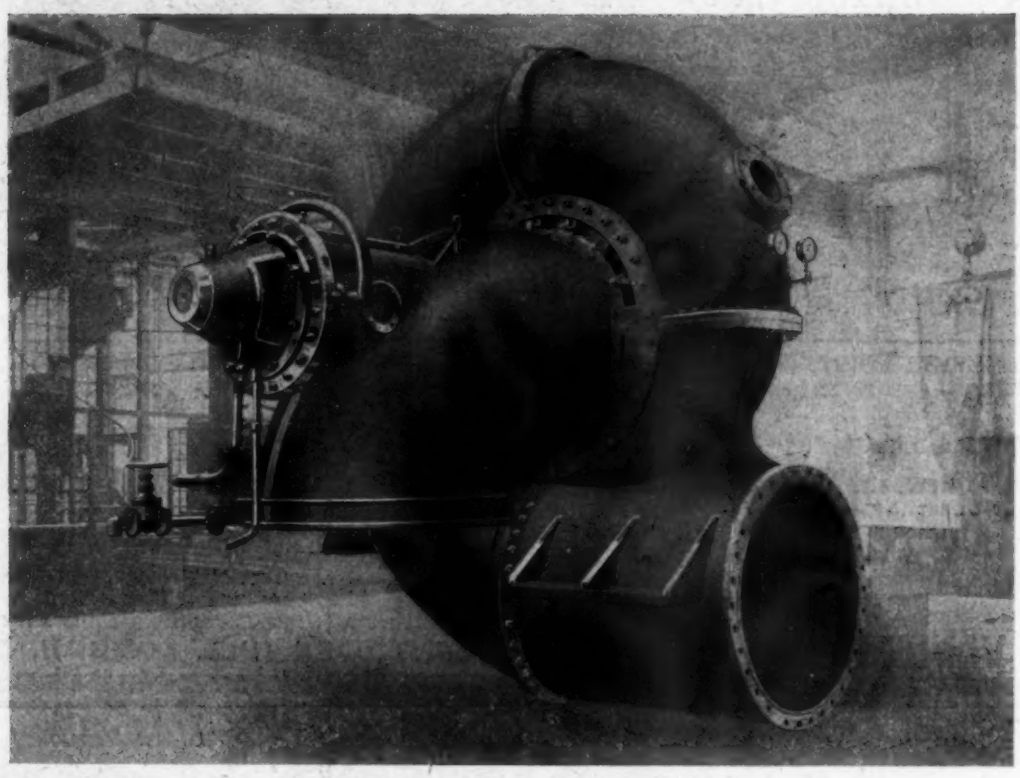

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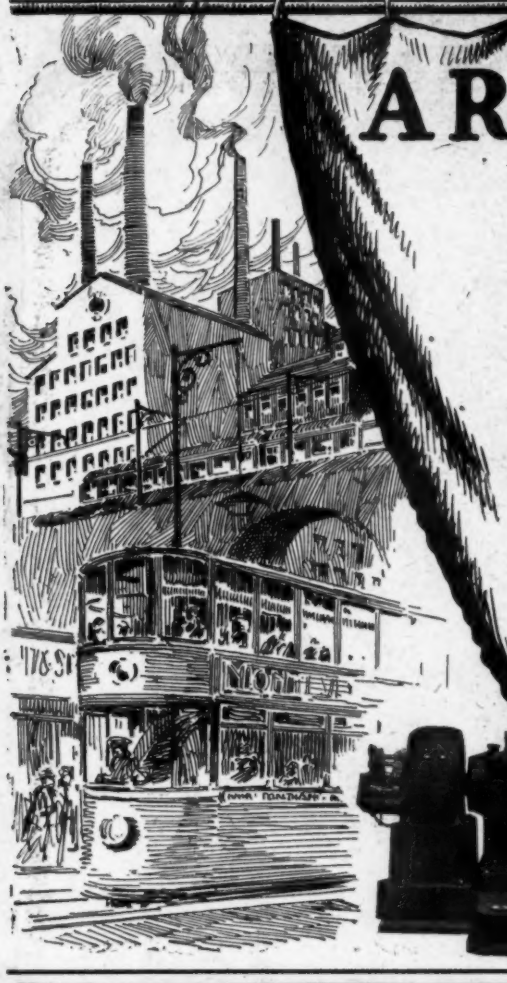

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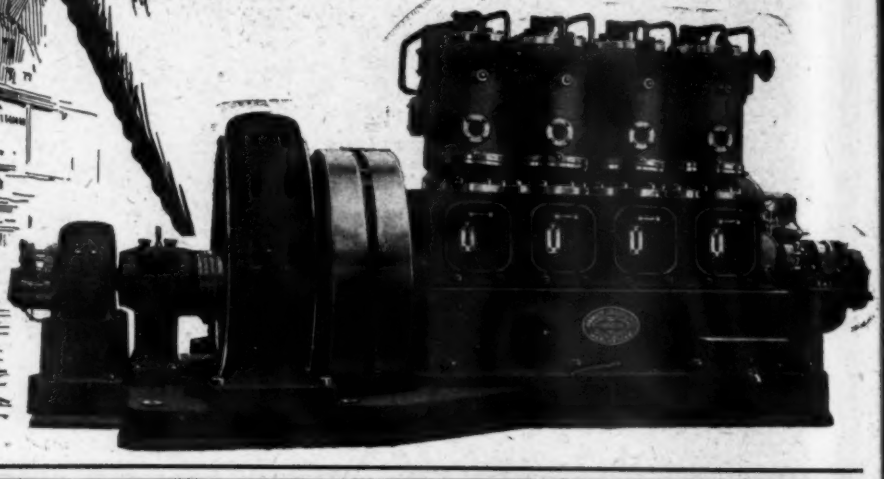

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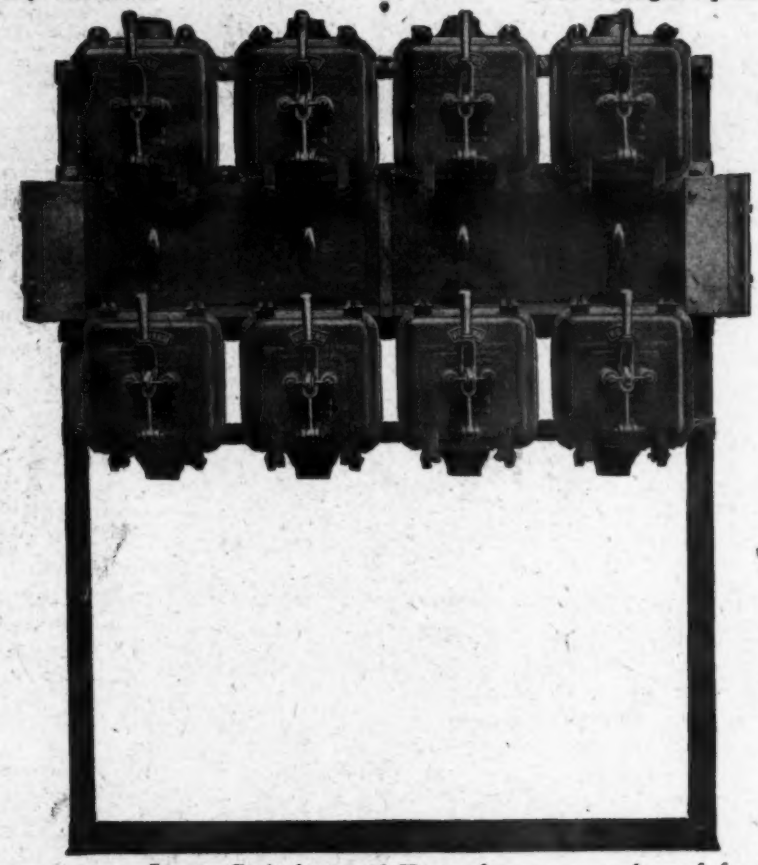

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DRAUGHTSMAN.

DRAUGHTSMAN required for the Council's Electricity Department. Must have had experience in making drawings on power and sub-station equipment, street mains, &c.

Apply, by letter only enclosing copies of not more than three recent testimonials, stating age, experience, and qualifications, and salary required, to Chief Engineer, Electricity Department, Lombard Road, Battersea, S.W. 11.

W. MARCUS WILKINS,
Town Clerk. 3288

ELECTRICIAN.

ELECTRICIAN wanted, with good knowledge of electric motors, as Motor and Meter Inspector, for a municipal electricity supply works. Some knowledge of mains repair work an advantage. Inclusive wages 60s. per week of 44 hours. Overtime at usual rates.

Apply ENGINEER, Electricity Works, Heywood. 3280

DRAUGHTSMEN.

DRAUGHTSMEN required for Government office at Portsmouth. Knowledge of electricity an advantage but not essential.

State age and experience to Box 792, Willings, 125, Strand, London, W.C. 2. 3111

SITUATIONS VACANT.—*Continued.*

CITY OF MANCHESTER.

Electricity Department.

SHIFT ENGINEER.

THE ELECTRICITY COMMITTEE of the Manchester Corporation invite applications for the position of Shift Engineer at their City Power Stations. Salary £250 per annum. Bonus £35 2s. per annum.

Candidates must have had a thorough practical and theoretical training in Mechanical and Electrical Engineering. Previous experience in both Direct Current and three-phase Alternating Current Stations employing large units is indispensable. The successful Candidate will be required to take up his duties as soon after January 1st, 1919, as possible.

Applications, stating age and experience, accompanied by two Testimonials, to be addressed to the Chairman of the Electricity Committee, Town Hall, Manchester, endorsed "Shift Engineer," and delivered not later than the 4th prox.

THOMAS HUDSON,
Town Clerk.

Town Hall, Manchester,
20th November, 1918. 3258

THE ELECTRICAL RESEARCH COMMITTEE.

Appointment of Technical Officer.

THE COMMITTEE (which is supported by the Research Department, the Institution of Electrical Engineers, and the British Electrical and Allied Manufacturers' Association) requires the services of a gentleman of high scientific and technical attainments as Technical Officer to direct and supervise, under the Committee, the research work undertaken by it. The commencing salary will be £1,000 per annum.

Applications (marked on the envelope "Technical Officer") stating age, qualifications, experience and other particulars, and addressed:—The CHAIRMAN, the Electrical Research Committee, 1, Albemarle Street, W. 1, should be delivered at that address not later than FRIDAY, 6th DECEMBER. 3271

GREENOCK CORPORATION.

Electricity Department.

A.C. METER TESTER AND REPAIRER.

APPLICATIONS are invited for the position of Meter Tester and Repairer. Preference will be given to applicants having a thorough knowledge of single-phase and polyphase watt hour meters. Wages 70s. per week (inclusive of all bonuses to date).—Apply, stating age, experience, and copies of recent testimonials, to

F. H. WHYSALL, M.I.E.E.,
Chief Engineer and Manager,
Dellingburn Street,
Greenock. 3244

INSTALLATION INSPECTOR.

Installation Inspector Required at Once.

APPLICANT must have had a thorough technical training and be conversant with the testing of large power and lighting installations. One with knowledge of maximum demand system preferred.

Applications in writing, enclosing copies only of testimonials, to ENGINEER AND MANAGER, 27, Osborn Street, Whitechapel, E. 1, not later than TUESDAY, NOVEMBER 26th. 3278

PLATELAYER.

WANTED, a Platelayer, with good experience of tramway repairs and reconstruction; rate 13½d. per hour, plus 12½% on earnings; permanency to steady reliable man.

Apply, stating age and experience, to GENERAL MANAGER, Corporation Tramways, Coventry. 3213

SHIFT ENGINEER.

SHIFT ENGINEER required for three-wire system with batteries. A reasonable wage for a 56-hour week, plus bonus and 12½% on total earnings. One month's notice on either side to terminate the engagement.

Applications to ELECTRICAL ENGINEER, Bexhill. 3182

OVERHEAD LINESMAN.

WANTED, Overhead Linesman, wages 1s. 4d. per hour, including all bonuses to date; must be good Linesman and willing to work in car shed when required.—Apply, giving full particulars, to 3250, ELECTRICAL REVIEW, 4, Ludgate Hill, London, E.C. 4.

(Continued on next page.)

SITUATIONS VACANT.—*Continued.*

COUNTY BOROUGH OF WOLVERHAMPTON.

ELECTRICAL ENGINEER'S DEPARTMENT.

Appointment of Fuel and Ash Superintendent.

APPLICATIONS are invited for the position of Superintendent to take charge of the handling of Fuel and Ashes at the Commercial Road Generating Station of this Department.

Applicants must be thoroughly competent Steam and Mechanical Engineers, good disciplinarians used to the control of men, and have had experience in the economical handling of large quantities of Fuel and Ashes, and the running and efficient maintenance of Coal Conveying and Unloading Plant.

Salary, including all War bonuses to date, £281 5s. per annum.

Applications, made on forms which, with list of duties, may be obtained from the undersigned, to be delivered in envelope endorsed "Fuel Superintendent," addressed to the CHAIRMAN OF THE ELECTRICITY COMMITTEE, c/o Town Clerk, Town Hall, Wolverhampton, on or before the 17th DECEMBER, 1918.

S. T. ALLEN,
Chief Engineer and General Manager. 3319

GREENOCK CORPORATION.

Electricity Department.

ASSISTANT ELECTRICAL SUPERINTENDENT.

WANTED an Engineer, with good theoretical and practical experience, to take up the duties of Assistant Electrical Superintendent. Applicants must have experience of erecting and maintaining High-tension and Low-tension Switchgear, and protective apparatus in connection with Static Transformer and Rotary Converter Sub-Stations.

Apply, stating age, wages required, together with full particulars of experience, technical training, and copies of not more than three recent testimonials, to—

F. H. WHYSALL, M.I.E.E.,
Dellingburn Street, Greenock. *Chief Engineer and Manager.* 3243

SWITCHBOARD ATTENDANT.

APPLICATIONS are invited immediately for the position of Switchboard Attendant. Salary 42s., plus 5s. and 12½ per cent. Preference will be given to man with technical training and works practice.

Applications, stating age, training and experience, and when at liberty, to be received not later than THURSDAY, NOVEMBER 28th, 1918.

J. B. PATTERSON,
Acting Electrical Engineer,
Electricity Works, Lancaster. 3285

OVERHEAD LINESMEN, CAR-SHED FITTERS, ARMATURE WINDERS, TICKET INSPECTORS.

EXPERIENCED MEN required for above positions; permanent situations to suitable applicants.

Apply, with references, stating age, experience and wages required, to—

GENERAL MANAGER,
Barrow Tramways,
Barrow-in-Furness. 3233

FOREMAN ELECTRICIAN.

FOREMAN - ELECTRICIAN (staff appointment) wanted for works in West of Scotland, with wide experience in running and maintenance of H.T. Generators, Transformers, Motors, A.C. and D.C. and Installation of Electrical Machinery.

Apply, stating age, experience and salary required, to—

3291, ELECTRICAL REVIEW, 4, Ludgate Hill, London, E.C. 4.

CHARGE ENGINEER.

WALLASEY CORPORATION ELECTRICITY DEPARTMENT are prepared to receive applications for the position of Charge Engineer in their new generating station. Must have had three-phase E.H.T. experience. Full bonus awards paid.—Applications to the ENGINEER'S OFFICE, Seaview Road. 3260

SHIFT ENGINEER.

SHIFT ENGINEER wanted for A.C. and D.C. station; must have had experience with turbines and E.H.T. 3-phase plant. Wages £3 5s., plus 12½%, per week.

Apply, giving full particulars, to the BOROUGH ELECTRICAL ENGINEER, Corporation Electricity Works, Leigh, Lancs. 3304

WIREMAN.

WIREMAN required for Lighting and Power, general repairs and meter fixing. Apply, stating age, wages required, &c., to—

3290, ELECTRICAL REVIEW, 4, Ludgate Hill, London, E.C. 4.

SITUATIONS VACANT.—*Continued.*

CABLE JOINTER.

CABLE JOINTER wanted, accustomed to lead-covered, paper-insulated, 3-core cable, and able to do own plumbing.

Must have had experience with 3-wire D.C. system.

Wages £2 10s. 6d. + 12½% and overtime.

Apply, stating age, experience, and giving references, to BOROUGH ELECTRICAL ENGINEER, Electricity Works, Brook Street, Basingstoke. 3307

METER TESTER.

WANTED, Meter Tester with good technical training; experience of C. & H. and Ferranti D.C. and A.C. Meters, also Mains Testing.

Apply fully, stating age, experience and wages required, to H. R. BURNETT, Corporation Electricity Works, Barrow-in-Furness. 3282

Cheap prepaid Advertisements are inserted under this heading at the rate of One Penny Per Word (minimum 1s.). Three Consecutive Insertions for the price of two, if ordered and prepaid with first insertion.
Box Number and ELECTRICAL REVIEW address count as seven words.

A LARGE firm of Telephone Engineers and Manufacturers in the provinces (Government controlled), have vacancies in their Designs and Drawing Office Sections. Applicants must have practical and technical experience. No person already on Government work will be engaged.—Apply, stating age, experience and wages required, through your nearest EMPLOYMENT EXCHANGE, quoting A6404. 3193

A NUMBER of thoroughly experienced Wiremen for country house lighting, power and telephone installations, required in Eastern Counties. Applicants must be thoroughly up in screwed tubing and casing work. Full time can be worked.—Apply MANN, EGERTON & CO., LTD., Princes Street, Ipswich. 3300

A WELL-KNOWN firm of electrical accessories and switchgear manufacturers require in their Sales Department an Assistant for the preparation of catalogues, advertisements, and similar publicity work. Should be well acquainted with lighting accessories. Please state details of experience, age, and salary required in confidence.—3303, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

A WELL-KNOWN firm of manufacturers require the services of a Superintendent for their Assembling Department. Applicants should be capable of taking charge of a department employing 150/250 hands engaged in the assembling of ironclad switches and fuses, fuseboards, lampholders, tumbler switches, wall sockets, ceiling roses, &c., and used to first-class work. They should be good organisers and disciplinarians, and capable of efficiently controlling female labour. The position is a permanent one with excellent prospects for the right man. Please give details of previous experience and salary required in confidence.—3302, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ARMATURE Winder for South of England tramways. Permanency for suitable man. State age, experience, wages required, and from whom references may be obtained.—6095, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ARMATURE Winder required for Electric Railway Shop in South London district.—Apply, stating full experience and wages required, 3263, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ARMATURE Winder, with experience of traction work. Highest district wages paid.—Apply, stating experience, &c., to MANAGER, Tramway Depôt, Greenock. 3272

ARMATURE Winders used to heavy traction motors wanted for London railway workshop.—6063, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ARMATURE Winders, used to repair shop, D.C. work.—Apply H. D. & S., 32, Newington Causeway, S.E. 1686

ASSEMBLY Shop Foreman wanted by London electrical switchgear manufacturers.—Apply, stating age, experience and wages required, to 6050, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ASSISTANT Engineer required for sales department. Applicants must have had a sound electrical engineering training, and preferably experience of the commercial side of the electric supply industry. Excellent prospects.—Applications to "SALES DEPARTMENT," The Yorkshire Electric Power Co., Dewsbury. 6094

ASSISTANT Estimator, young, wanted for London office of accumulator manufacturers. Permanency if suitable.—State particulars of experience and wages required to 3229, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ASSISTANT to Works Manager wanted by firm of accumulator makers; must be conversant with detail, design and manufacture of principal types of secondary batteries; good organiser.—Write, stating age, experience and previous employment, to 6114, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

(*Continued on next page.*)

SITUATIONS VACANT.—*Continued.*

ASSISTANT wanted, to take charge of Instruments, Test room, Moving Coils and Moving Iron Instruments.—State age, experience and salary required, to 3248, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

DESIGNER and Draughtsman.—Wanted, Designer used to small electrical work and experience of electric motors. Likewise a good Junior wanted. Countryjob, good pay, permanent position. —Apply first instance by letter to T. H. BROOKER & Co., 46, Fetter Lane, E.C. 3224

DESIGNER. — Controlled firm of motor and dynamo makers A.C. and D.C., employing about 200 hands, have vacancy for Designer. Previous experience in similar position essential, also in design of repulsion induction motors. State qualifications and salary required. — 3305, ELECTRICAL REVIEW 4, Ludgate Hill, London.

DISTRICT Engineer required, experienced in O.H. line work, and with good knowledge of plant on consumers' premises, &c.—Apply, stating all particulars and wage required, to SCOTTISH CENTRAL ELECTRIC POWER Co., 1, Kirk Wynd, Falkirk. 2877

DRAUGHTSMAN, capable man with technical knowledge for H.T. Switchgear.—Apply, stating age, salary and experience, to 3287, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

DRAUGHTSMAN, experienced, wanted for motor starters.—State age, salary and experience, to 3286, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

DRAUGHTSMAN required, accustomed to mechanical design and detail of small dynamos and motors. Must be capable and accurate worker. Good post-war prospects for competent man. N.W. district.—Write, stating experience, to 3225, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

DRAUGHTSMEN wanted for traction motors and equipments, generators and turbines for works in north-west.—Apply, stating full experience, age and salary required, to 3312, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRIC Fitters.—Several first-class men wanted at once; permanency if suitable. Full rates.—W. D. WILLSON, 85, High Street, Croydon. 'Phone 319. 6039

ELECTRIC Lamps.—Technical Assistant required to supervise orders through the factory; previous experience preferable. —Apply EDISON SWAN Co., Ponders End. 3177

ELECTRICAL Draughtsman required with experience in traction motor and control.—Apply, stating experience, age and salary required, to 3276, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICAL Engineer, experienced in the design of electrical measuring instruments, and capable of taking charge of the engineering and designing section of a department engaged in the manufacture of such apparatus, wanted by large firm in the North. No one already on Government work will be engaged.—Apply to your nearest EMPLOYMENT EXCHANGE, mentioning No. A6374, and stating age, experience and salary required. 3274

ELECTRICAL Fitters and Wireman wanted, union rate paid.—THE ELECTRIC LIGHT INSURANCE AND MAINTENANCE Co., 1 & 2, Rupert Court, Rupert Street. 3301

ELECTRICIAN and Motor Mechanic wanted to take charge of an electric light installation which will occupy about half his time, the remainder to be devoted to any necessary repairs on Rolls-Royce, Sunbeam, and other cars. Must have good knowledge of electrical plants and be a skilled mechanic, and have had experience with Rolls-Royce cars. House, suitable for married man, provided, with light and fuel.—State wages required, and send copies (only) of references, addressed SECRETARY, Wadhurst Hall, Sussex. 3267

ELECTRICIAN wanted by a large industrial concern near London. Must have good all-round experience in maintenance work and extensions, accustomed to repairs to motors, switchgear, and modern electric light installations; good prospects for the right man.—Reply, giving full particulars of experience, references and wages required, to 3160, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ENGINEER, with first-class mechanical and electrical training, wanted for estimating and contracts by large electrical and manufacturing company in Midlands. No person already on Government work will be engaged.—Apply, giving experience, salary required, and when can commence, to your nearest EMPLOYMENT EXCHANGE, quoting No. A6383. 3186

ENGINEER'S Draughtsman required.—State experience and salary required.—GIRLING, Electricity Works, Maldon, Essex. 3273

ENGINEERS (three) electrical, wanted, young, with workshop experience, for British East Africa. Passages paid and three years' agreements.—Write, stating qualifications, to Z. M., 998, care Deacons, Leadenhall Street, E.C. 3. 6081

EXPERIENCED Foreman or Forewoman required to take charge of flashing and mounting department, carbon filaments.—9728, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

SITUATIONS VACANT.—*Continued.*

EXPERIENCED Rate Fixer, must be good practical man with sound knowledge of latest machine shop practices, by large engineering firm in the Midlands. Position permanent.—Apply, giving full particulars of experience, age and salary required, 3309, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

EXPERIENCED Wiremen and Mates wanted.—Apply ENGINEERING WORKS, LTD., 7, Great Winchester Street, E.C. 2. 6104

FIRST-Class Armature Winder required, used to traction motors and manufacture of armature coils. Permanent position to suitable man. State salary required together with two references. No person already on Government work will be engaged.—Apply your nearest EMPLOYMENT EXCHANGE, mentioning No. A6412. 3228

FITTER (mechanical) wanted.—Apply with full particulars of experience, stating age, and enclosing copies of testimonials, to NORTHAMPTON ELECTRIC LIGHT & POWER Co., LTD., 25, Bridge Street, Northampton. 3214

FITTER required in Central Station. Previous knowledge desirable of turbines and other central station plant. Wages 10½d. per hour, plus bonuses.—Apply 50, Eden Grove, Holloway, N. 7. 5979

FITTER wanted for Electricity Works in outer London district. Accustomed to overhaul and maintenance of turbine and reciprocating engines and water-tube boilers. Permanent job to competent and steady man. A.S.E. rates paid, plus awards.—Apply, stating age and particulars of experience, to 3316, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

FLEXIBLE Shafts Foreman required for manufacture of small flexible shafts. Must be capable of getting maximum production.—Apply, stating age and experience, &c., to Box A. Z., Smith's Publicity Service, 185, Great Portland Street, London, W. 1. 6059

FOREMAN wanted, by large electrical concern, to take charge of manufacture of electrical meters and instruments for industrial purposes. Applicant must be able to supervise both male and female labour on machining and assembling operations, fix piecework prices, and have had experience in a responsible position on similar work. Permanent and progressive position. No one already on Government work will be engaged.—Apply with particulars of experience, age and salary required, to your nearest EMPLOYMENT EXCHANGE, mentioning A6123. 3113

IMPROVER wanted in a 3-wire D.C. generating station.—Apply, in first instance, to 3162, ELECTRICAL REVIEW, 4, Ludgate Hill, London, stating age, training and wages expected.

INSTRUMENT Repairer required for repairs to meters and electrical instruments. Good small lathe hand essential, used to accurate work. Wages 10½d. per hour, plus bonuses.—Apply in writing, giving particulars, 50, Eden Grove, Holloway, N. 7. 5980

JOINTER-Wireman wanted for high and low-tension cables; able to do own plumbing; one with experience of car wiring preferred.—Applications with experience, salary required, when at liberty, and enclosing copies of testimonials, to RHONDDA TRAMWAYS Co., LTD., Porth, Glam. 6013

JUNIOR Estimators and Draughtsmen required for high and low-pressure Switchboards; Manchester district. — 3275, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

LARGE Dynamo Firm, not in Manchester or the Midlands require immediately two Assistant Electrical Designers, one familiar with alternate-current machines from 100/600 H.P., and the other familiar with direct-current machines over the same range.—State in confidence, experience and salary required, to 3245, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

LONDON Manufacturing Firm require Switchgear Draughtsmen. —Apply, stating age, experience and salary required, to 6001, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

POSITION Vacant, Purchasing Office, London. Metal stampers including electrical accessories manufacturing, &c. Excellent opportunity. Apply stating previous experience, age, minimum salary required.—3268, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

PRESS Shop Foreman wanted. First-class man, experienced in very fine work such as watch and clock details. Good salary and first-class prospects for the right man.—Apply, stating age, experience, &c., to Box A. X., Smith's Publicity Service, 185, Great Portland Street, London, W. 1. 6057

REPRESENTATIVE required immediately for a firm of Engineers in London. Applicant should have a good connection amongst Contractors, Stores, and other Buyers of all Electrical Goods. —3212, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

REQUIRED, Draughtsman in Central Station, mechanical training desirable. Wages £2 15s. plus bonus.—Apply in writing, giving particulars, 50, Eden Grove, Holloway, N. 7. 5978

(Continued on next page.)

SITUATIONS VACANT.—*Continued.*

SEVERAL experienced Magneto Testers wanted. Good position for reliable men. No person on Government work will be engaged.—Apply your nearest EMPLOYMENT EXCHANGE, mentioning A6316. 3101

SHIFT Engineer for tramway and lighting power station in Ceara, Brazil. £350 per annum.—Apply, J. KERR-BOCK, Consulting Engineer, 60, Queen Victoria Street, London. 3281

SHIFT Engineer wanted at once for power station. Experience of E.H.T., A.C., also D.C. supply essential.—Apply, stating particulars of age, previous experience, salary required, with copies of recent testimonials, to RHONDDA TRAMWAYS CO., LTD., Porth, Glam. 6014

SILK Shades.—Manageress to take charge workroom. Must thoroughly understand high-class goods. Liberal salary.—Write in confidence, 6051, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

SIX Men required, used to good class switch work; also six Armature Winders.—J. STONE & CO., LTD., Deptford, London, S.E. 2944

SKILLED Fitters and Wiremen, for erecting electrical installations in London, Sheffield and Derby districts. Recognised rates and district allowances paid.—Write, giving particulars of experience, &c., to CONSTRUCTION DEPARTMENT, B.T.H. Co., Rugby. 3240

SMART and reliable Estimator's Assistant required on switchgear junction boxes, distribution pillars, &c., for munition works within 10 miles of Liverpool. Must be able to read drawings correctly, and have good knowledge of shop costs. No man on Government work need apply.—Apply your nearest EMPLOYMENT EXCHANGE, mentioning this paper and No. A6391. 3187

SUB-STATION Attendants, accustomed to self-synchronising rotaries and D.C. three-wire system for private sub-station, Glasgow district. State experience and wages expected.—Address "SYSTEM," Wm. Porteous & Co,, Advertising Agents, Glasgow. 6061

SWITCHBOARD Attendant.—Switchboard Attendant wanted, with experience in charge of A.C., H.T. and D.C. traction supply. Wages 62s. per week of 6 shifts of 8 hours, including all bonuses to date.—Apply with reference, and stating experience, to CHIEF ENGINEER, Bournemouth & Poole Electricity Supply Co., Ltd., Verulam House, Bournemouth. 3176

SWITCHBOARD Attendants for station in Manchester district. Apply, with copies of testimonials, stating age, wage and experience, 3191, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

TECHNICAL Editor.—Well qualified, experienced man required by firm of publishers for their technical book department.—Apply, with full particulars, to Box No. 563, F. E. Potter, Ltd., Temple Chambers, Temple Avenue, E.C. 4. 3238

TEST Room Assistant wanted for general testing by switchgear manufacturers (Tyneside). No person already employed on Government work will be engaged.—Apply by letter, stating age, wages, experience, &c., to your nearest EMPLOYMENT EXCHANGE, mentioning this paper and No. 3178.

TEST Room Assistants wanted; electrical knowledge essential, and some instrument experience advisable.—Apply The CAMBRIDGE SCIENTIFIC INSTRUMENT CO., LTD., Cambridge. 3315

TRANSFORMER Designer required for large Manufacturing Firm in Manchester district. Must have experience in large transformers of all descriptions. Permanent position and good salary to the right man.—Address to your nearest EMPLOYMENT EXCHANGE, stating No. A6437. No one already engaged on Government work need apply. 3234

TRAVELLER, to represent leading British lamp and General Accessories Manufacturing Company, in Hampshire and Mid-South Coast territory. Applicants should be prepared to live in district. State fullest particulars.—3283, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, an Electrical Engineer, for a large Manufacturing Works in the Midlands; a first-class man able to undertake repairs to motors, up-keep, and lighting, and also undertake any additional wiring or setting down of motors; first-class man will have every encouragement, permanent situation; full particulars of experience and present and past employers; hours 6 to 5.30. Wages £5 5s. per week including bonus.—3143, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, at once, Electrician, experienced in petrol electric vehicles and C. A. V. lighting sets. No person engaged on Government work need apply.—Apply your nearest EMPLOYMENT EXCHANGE, mentioning No. A6375. 5998

WANTED an Assistant to help in the production of high-class Electrical Insulating Materials for E.H.T. apparatus. Experience with moulded insulation an advantage. Manchester district. No one already engaged on Government work need apply.—State salary, age, &c., to your nearest EMPLOYMENT EXCHANGE, stating No. A6436. 3235

WANTED, by a firm in the S.E. district engaged on munition work, first-class Telegraph Mechanics.—State age and experience to 6125, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

SITUATIONS VACANT.—*Continued.*

WANTED, by electrical manufacturing firm as Personal Assistant to Director, young man with electrical and mechanical training; one with several years' workshop experience preferred.—State fully, experience, age and salary expected, 6090, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, by leading engineering insurance company, Electrical Surveyors, having good knowledge of the theory and practice of alternating and direct current plant. Applicants must be ineligible for the Army or Navy.—2581, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, by old-established firm of Electrical Contractors in the North of England, a thoroughly competent man for installing of private telephone and bell installations. Must have had first-rate experience, and be able to measure up and prepare quantities. A good permanent position for the right man to organise the special department.—3247, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, Electrician, to assist in the upkeep of D.C. motors and light. Armature repairing a recommendation; private installation in Midlands.—3241, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, experienced Diesel Engine Drivers.—Men willing to train should also apply to LEATHERHEAD ELECTRICITY WORKS, Leatherhead. 5981

WANTED, experienced General Foreman, in cable works, London district. Must be accustomed to all classes of rubber, bitumen and lead-covered cables.—Write, stating age, experience and salary required, to 3261, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, for a Paper Mill in Kent, an Electrical Engineer; must be fully qualified to repair and keep in order dynamos and motors, do all wiring, &c.—Apply for particulars to 3264, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, for a South American Gold Mining Company, an experienced Mechanical Electrical Engineer, capable of rewinding motors and with a thorough knowledge of alternating-current machines. Preference given to one speaking Spanish.—Apply, PELLEW-HARVEY & CO., 62, London Wall, London, E.C. 2. 3279

WANTED for large Shipbuilding Establishment in Birkenhead district, two Armature Winders and two Electrical Instrument Makers. Good wages, plus 12½% bonus. No person already employed on Government work will be engaged.—Apply to your nearest EMPLOYMENT EXCHANGE, quoting reference No. A6397. 3183

WANTED immediately, an Assistant Superintendent for a large winding and electrical assembly department engaged on the manufacture of small motors and dynamos. Must be an energetic man; able to control male and female labour; good timekeeper and disciplinarian; permanent position.—Write, stating age, wages required and experience, to 3252, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED immediately, or in the near future, Cost Clerk, under 30 years of age, and preferably unmarried, for Telephone Company in India. Full details of experience, present salary, &c.—GILL & COOK, Winchester House, Broad Street. 6123

WANTED, Lead Press Driver for cable works, London district, must be experienced man.—Write, stating age, experience and salary required, to 3262, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, Order and Despatch Clerk, must be an experienced and active man, used to the handling of motor and electrical accessories. Good prospects in rapidly growing business.—Reply by letter, stating age, experience and salary required, to "F. G.," c/o Morris, Russell & Co., Ltd., 75, Curtain Road, E.C. 2. 3223

WANTED, permanent Wiremen. Supply undertaking in the Midlands. Rate 1s. 3d. per hour, including all bonuses.—Reply, stating age and experience, to 3215, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WINDING Foreman required, used to small work. Must be able to turn out repetition work on armature and field-coil binding in large quantities at the right cost.—Apply, stating age and experience, to Box A. Y., Smith's Publicity Service, 185, Great Portland Street, London, W. 1. 6058

WIREMAN, good quick worker for repairs and small jobs. Rate 1s. 6d., and more if satisfactory after trial.—BRICE, 145, High Holborn. 6070

WIREMEN wanted for London district.—Apply F. G. EDEY AND CO., LTD., 25, Warwick Lane, Newgate Street, E.C. 4. 5993

YOUNG Assistant Draughtsman required; one with experience in small electrical machines or magnetos preferred.—Reply, stating age, full particulars of qualifications and salary required, to "B. L. I. C.," 204, Tottenham Court Road, W. 1. 6060

(Continued on next page.)

SITUATIONS WANTED.

Cheap prepaid Advertisements are inserted under this heading at the rate of One Penny Per Word (minimum 1s.). Three Consecutive Insertions for the price of two, if ordered and prepaid with first insertion.
Box Number and ELECTRICAL REVIEW address count as seven words.

ACCOUNTANTS, undertake income tax, balance sheets, book-keeping; moderate.—53, Crayford Road, London, N. 7. 5934

ADVERTISER desires position as Works Foreman (engineering). Held position in press and core building shops for eight years in electrical firm in Midlands. Works foreman in manufacturing and repair shop, Liverpool district, three and a-half years. Age 44. Disengaged.—6107, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ADVERTISER, 25 years' experience, been on Government work past three years, desires position of supervision or maintenance inspector.—6083, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ADVERTISER (35), A.M.I.E.E., desires change; chief draughtsman, development, or position of responsibility; 15 years' experience in design of switchgear, switchboards and control gear; C. and G. Hons. Certificate Electrical Engineering.—6037, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ADVERTISER (46), 20 years' official in electric tramways, with generating station experience, desires position in traffic or electrical department; good disciplinarian. South or West Coast town preferred.—6096, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

AN Electrical Engineer, well versed in all Admiralty practices on H.M. ships, and at present employed in one of H.M. principal dockyards, desires an equivalent position where ability and zeal are not hampered by red tape.—5952, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ASSISTANT Resident Engineer of Electric Power Co., desires position abroad; Public School and University.—6011, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ASSISTANT Resident Engineer, young, desires change; some D.C. experience, and 4 years' E.H.T. and L.T. transformation and distribution; South Coast or S.E. counties preferred.—6116, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

BRANCH Manager's position required with an Electric Supply Company by young man, fully experienced. — 6111, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

CABLE Manufactures.—Advertiser seeks re-engagement; 26 years' experience, washing, mixing, callendering, forcing, longitudinal covering, braiding, stranding, vulcanising, &c.; control of labour; home or abroad.—6128, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

CAPABLE Electrical Engineer, 14 years' practical and technical experience, seeks position where ability is appreciated.—6067, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

CLERK, ten years' experience Electric Supply work, accounts, wages, allocations, stores, &c., desires change. — 6093 ELECTRICAL REVIEW, 4, Ludgate Hill, London.

CHARGE Engineer, desires permanent post. 16 years' sound experience; A.C. and D.C., &c.—MR. B., c/o Baldwin, 47, Cliffe Street, Keighley, Yorkshire. 6088

COMPETENT Electrician desires charge of installation. Southern Counties.—5948, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

CONTRACTORS' Electrical Engineer (31), desires appointment, Home or Abroad. 10 years' supervision experience in L.T. and E.H.T. cable laying and overhead transmission lines, colliery, town lighting, &c. Present, engineer manager, electric supply company.—6089, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICAL and Mechanical Engineer desires post as Inspector or Charge of Test Room; well up in small motor, switchgear and projector work; 15 years' experience.—5960, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICAL and Mechanical Engineer, fully qualified, requires post in Australia or Colonies; complete equipment and installation of works, or factory plant maintenance and management, A.C. and D.C. machinery, Diesel and turbine engines.—6044, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICAL and Mechanical Engineer, shortly disengaged, seeks post as Manager or Foreman; 15 years' experience shipyard, Admiralty and factory supervision; used to handling large numbers of men and all classes of electrical and mechanical plants and machinery. Thorough business training.—6005, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICAL Engineer desires appointment as Manager. Experienced in layout of large power and lighting installations and maintenance. Workshop and office routine; technical; able to control staff.—6124, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICAL Engineer, disengaged, requires situation; 18 years' experience in all branches, technical and commercial training.—6127, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

SITUATIONS WANTED.—*Continued.*

ELECTRICAL Engineer, knowledge petrol paraffin engines, car lighting and accumulator manufacture, desires post.—6019, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICAL Engineer, with wide and varied experience in lay out, erection and maintenance of large power and lighting plants, accustomed to control a large number of men, desires a responsible position on Government work.— 5975, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICAL Engineer, with 12 years' practical, theoretical and commercial experience, at present in charge of large magneto repair department, desires to get in touch with a firm with the view of obtaining a responsible position when released from military duties.—6112, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICAL Mechanical Engineer (35), desires staff position College, shops, central station (mains and generation), contracting, manufacturing, and commercial experience. Sound theory, Now managing electrical department under Admiralty. Experimental work if required. Midlands preferred. £350.—6065, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICAL Wireman seeks situation; lighting and power, factory or private plant.—H., 130, Craven Park Road, Harlesden, N.W. 6087

ELECTRICIAN (experienced) offers services, maintenance or construction lifts, motors, lights, bells, telephones and instruments.—State working hours and wages offered, to 6129, ELECRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICIAN requires situation; used to A.C. and D.C. motor work, lighting, &c.—R., 50, Burlington Gardens, Acton. 6101

ELECTRICIAN, well up in motors, lighting, switchboards and machinery; 10 years' experience. — 6080, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICIAN'S Assistant seeks light situation.—6082, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ENGINEER, aged 30, desires change, supervising contract work, or Branch Managership; Midlands or North Wales; 10 years' supervisor transmission lines, cables, collieries, town lighting, conversant in handling large bodies of men, could introduce good work after war.—6018, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ENGINEER, A.M.I.C.E., A.M.I.E.E., with 13 years' practical experience, including instrument and experiment work, is free for suitable engagement.—5977, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ENGINEER, A.M.I.E.E., age 36, practical and commercial electrical experience, desires position as Representative, speaks fairly good French, would go abroad; at present Assistant Electrical Engineer at Admiralty Dockyard.—6079, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ENGINEER, energetic, with 12 years' practical and commercial experience, desires position in Development and Publicity Department, or as Consumers' Engineer.—6022, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ENGINEER, experienced, working, 22 years' experience in charge of Large Works, doing all own erecting, own repairs, both electrical and mechanical, thoroughly reliable, excellent testimonials, disengaged. — POWELL, 70, Standen Road, Southfields, London, S.W. 6103

ENGINEER - Electrician, experienced, seeks charge of country house plant or Institution. Steam, oil or gas plant.—6033, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ENGINEER-Electrician (34), married, discharged soldier, desires re-engagement on private estate; thorough knowledge of gas, oil engines, electrical plants, farm and dairy machinery.—A. REED, 40, Sherborne Road, Yeovil, Somerset. 6075

HEATING and Cooking Apparatus.—Engineer, formerly commercial manager for prominent makers, is now free to resume either commercial or productive work.—6010, ELECTRICAL REVIEW, 4, Ludgate Hill, London

LABOURER, disengaged; used to heavy tube work. Rate 11½d. per hour. N.S.V.—J. F., 32, Claremont Square, Islington, N. 1. 6072

LADY Shorthand-Typist desires change to South country (not London); 8½ years' experience; present position over four years.—5967, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

MANAGER or Works Manager, shortly disengaged, 26 years' works experience, electrical instruments; practical, energetic, and good organiser, will take financial interest; can introduce new post war lines.—5945, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

OFFICER, with good pre-war experience in electrical engineering technical, workshop, drawing office, and power house construction, wishes to correspond with principals, with view to position; small progressive firms preferred.—6066, ELECTRICAL REVIEW, 4, Ludgate Hill, London,

(*Continued on next page.*)

SITUATIONS WANTED.—*Continued.*

PLANT Engineer-Electrician, charge hand, desires change; maintenance boilers, steam, Diesels, lighting, power.—6092, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

POST required, Shift Engineer used to Diesels and switchboard, A.C. plant; not eligible.—E. J. B., Gordon House, Gordon Road, Ashford, Middlesex. 5962

REQUIRED, Position as Foreman; mechanical and electrical experience, 36 years in Trade (18 years generating station, charge hand); also experience in general steam maintenance and general routine of hotel, seaside or town.—6115, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

SHOP Engineer, Assistant Works Manager, or other suitable position, required now or post War by University-trained Electrical Engineer, aged 29. Four years technical design Alternators and Induction Motors; 14 months Assistant Electrical Engineer, H.M. Factory. Test house, power house records and accounts, workshop supervision, technical editorial experience. Knowledge French and Publicity.—5955, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED, progressive responsible position, sales, buying, &c. Wide experience. Last situation 14 years. Technical and practical experience. Highest refs.—6054, ELECTRICAL REVIEW, 4, Ludgate Hill, London,

WIREMAN requires situation, lighting, telephones, motors, &c.; 12 years' experience.—G. R., 22, Hatfield Road, Bedford Park, W. 4. 6102

WIREMAN, used screwed tubing, repairs, testing, lighting, bells, arcs, factory work, desires permanency, London.—6008, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

PARTNERSHIP.

Cheap prepaid Advertisements are inserted under this heading at the rate of One Penny Per Word (minimum 1s.). Three Consecutive Insertions for the price of two, if ordered and prepaid with first insertion.
Box Number and ELECTRICAL REVIEW address count as seven words.

ELECTRICAL Engineer, (33), A.M.I.C.E., A.M.I.E.E., with varied experience, including instrument and research work, desires responsible post. Would invest £1000 in sound concern.—6117, ELECTRICAL REVIEW, Hill, 4, Ludgate London.

AGENCIES.

OOSTERHUIS BROS., ARNHEM (HOLLAND).

DUTCH Electrical and Technical, wholesale and export firm, wants connections with manufacturers and buyers all over the world. 6026

POST-WAR OVERSEAS TRADE.

COMMERCIAL Engineer (with 20 years' Indian and Colonial experience) is open to accept Agencies for enterprising firms who desire to open up, or expand, their business in India in:—(1) Wires and Cables (electric and haulage); (2) Machine Tools; (3) Motor Car Accessories; (4) General Engineer's Supplies (with a speciality).
6053, ELECTRICAL REVIEW, 4, Ludgate Hill, London, E.C. 4.

SOLE REPRESENTATION.

WILL Manufacturers who are prepared to negotiate with responsible London Firm for Sole Representation, write—
3306, ELECTRICAL REVIEW,
4, Ludgate Hill, London, E.C. 4.

Cheap prepaid Advertisements are inserted under this heading at the rate of One Penny Per Word (minimum 1s.).
Box Number and ELECTRICAL REVIEW address count as seven words.

BRAZIL.—Wanted immediately.—To act as Engineer and Representative for British manufacturers of general electric supplies and crude oil engines by a Royal Engineer officer about to be retired. Advertiser was State engineer to Brazilian Government previous to hostilities, and has eight years valuable experience of Brazilian requirements. Selected territories where advertiser is known have been chosen, and business relations may be introduced with advantage. Contract conditions expected are two years' sole selling agency on commission with option of extending to five years. Retaining fee of £300.—For interview, please write 6016, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

AGENCIES.—*Continued.*

CABLE Agency.—Cables Insulated and Wires. A go-ahead London House of over 25 years' standing requires Sole London Cable Agency (and for adjacent counties). Excellent storage accommodation and connection. Negotiations with principals only.—6009, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

COMMERCIAL Engineer, with excellent connection in Lancashire and Cheshire, is prepared to consider agencies for A.C. and D.C. motors, switchgear, cables, and transformers. Works established for showing, testing, and repairing.—3200, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICAL Engineer, 25 years' experience, residing in Birmingham district, desires to communicate with firms interested in establishing a Birmingham Agency for post-war activities.—6121, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ELECTRICAL Firm, with extensive showrooms in West End of London are open for Agencies. Motors, Dynamos and Tools.—Apply WALLACE & Co., 53, 56 and 58, High Street, W.C. 6074

ELECTRICAL Supplies for ships and factories. Electrical firm with offices and stores in City, is desirous of representing manufacturers for Liverpool and district.—6064, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

FRANCE.—Agent, in touch wholesale buyers, wishes exclusive Agency for (1) France, or (2) S.E. France. All classes electrical goods; highest references.—6068, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

GENTLEMAN wishes agencies for manufacturers of electrical goods. Has very large connections, municipal authorities, electrical companies and wholesale trade, also Continental. Immediate orders in hand for Continent.—6098, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

SELLING Agencies desired by a Manchester Wholesale Electrical Supply Co., for Electrical Tools, Small Motors, Car Lighting Sets and Fittings, Batteries and Accumulators, &c.—3255, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WELL-known electrical firm is open to consider an agency for high-class electrical plant for Lancashire district.—3201, ELECTRICAL REVIEW, 4, Ludgate Hill, London

WELL-Known London Electrical Engineers require Agency.—6069, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WHOLESALE House in the North, with long standing, is open to consider proposals, from manufacturers of switchgear, motors, cables, accessories, &c., who are open for representation in the North.—3254, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

FOR SALE.

ELECTRIC PLANT.

MAGNIFICENT 500-H.P. Horizontal Tandem Gas Engine, together with 350-KW. Alternator, by G.E.C., 230 volts, three-phase. Price £2,500. Set will be sold separately if desired.
One 300-KW. Alternator, by the Westinghouse Co., 2400 volts. Price £600.
One 250-KW. Belt or Rope-driven Multipolar Generator, by B.T.H. Co., 500 volts, D.C., compound wound; a very fine machine. Price £575.
One 100-H.P. Belt or Rope-driven Multipolar Generator or Motor, by Parker, 230 volts, D.C., compound-wound. Price £250.
Six 25-H.P. Traction Motors, series wound, 500 volts, by G.E.C. Price £75 each.
One 8-H.P. Series-wound Motor, 500 volts. Price £30.
One 6-H.P. Series-wound Motor, 230 volts. Price £25.
JOHN F. WAKE, Engineer, Darlington. 3145

NEW ELECTRIC CABLE FOR SALE.

629 YARDS 0·007 sq. in. Twin P.I.L.C. Armoured and Jute served Low-tension Cable.
108 yards 0·035 sq. in. c/c ditto.
100 yards 0·25 sq. in. c/c ditto.
Manufactured by Henley's.
Also 17 Tee Joint Service Boxes for above Cable for 0·035 sq. in. c/c through, and 0·007 sq. in. twin off.
One 4-way Link Disconnecting Box for 0·35 sq. in. c/c Cable.
27 Sealing End Boxes, various sizes.
Can be inspected by appointment.
3270, ELECTRICAL REVIEW, 4, Ludgate Hill, London, E.C. 4.

CABLE, &c., FOR SALE.

12 MILES 1/18 Cable; 20 miles 3/22 Cable. Ironclad Switches and Fuses, all amperages; 1200 G.G.S.C. Holders, 1000 s/c Batten Holders; Motors, all sizes and voltages. All ex stock for London delivery only.—3185, ELECTRICAL REVIEW, 4, Ludgate Hill, London, E.C. 4.

(Continued on next page.)

FOR SALE.—*Continued.*

MACHINERY FOR SALE.

D.C. MOTORS.

H.P.	Volts.	R.P.M.	Windings.	Makers.	Type.
30	400/440	850	Shunt intple.	Royce Bros.	Encl's'd, v'ntilat'd.
27	460/480	950	" "	Brush Elec.	" "
20	440/460	750	" "	Bruce Peebles	" "
20	440/460	1250	" "	E.C.C.	Tot. en., pipe vent.
15	230	800	" "	Royce Bros.	Encl's'd, v'ntilat'd.
13	400/420	1000	Shunt wo'nd.	Mather & Platt.	Totally enclosed.
12	200/220	950	" "	Cutting Bros.	Encl's'd, v'ntilat'd.
10	420	1000	" "	Electromotors.	" "
10	400/440	750	Shunt intple.	"	Totally enclosed.
9½	400/460	750	" "	E.C.C.	" "
8	230	480	" "	Royce Bros.	Encl's'd, v'ntilat'd.
8	440	950	Shunt wo'nd.	Gen. Elec. Co.	Tot. en., reversing.
7½	440	880	" "	Siemens Bros.	Encl's'd, v'ntilat'd.
7½	230	880	" "	" "	Totally enclosed.
5	230	880	" "	" "	Encl's'd, v'ntilat'd.
5	440/460	1200	" "	Cutting Bros.	" "
4	400	1150/1835 variable.	" "	Gen. Elec. Co.	" "

A.C. MOTORS.

H.P.	Volts.	R.P.M.	Periods.	Phase.	Makers.	Type.
30	400	750	50	Three.	Clayton Motors.	Encl's'd v'ntilat'd.
12	420	960	50	"	Gen. Elec. Co.	" "
10	440	950	50	"	Brook & Co.	Tot. en., pipe vent.
5	420	1450	50	"	Wright & Wood.	Encl's'd v'ntilat'd.
3	420	1450	50	"	" "	" "

GENERATORS.

17 KW., 230 volts, 1200 R.P.M., shunt wound, Holmes & Co., makers, enclosed, ventilated type.
300 watt, 160 volts, 1250 R.P.M., shunt wound.

YARNALL & CO.,
Cornwall Street Ironworks,
Openshaw, Manchester. 3259

MOTORS AND DYNAMOS FOR SALE.

A.C.

One 7½ H.P., 230 v., 50 periods, 710 R.P.M.
One 6 H.P., 230 v., 50 periods, 950 R.P.M.
One 2 H.P., 230 v., 50 periods, 1460 R.P.M.
One ½ H.P., 220 v., 50 periods, 1460 R.P.M.
Four 18" Exhaust Fans, 230 v., 50 periods.
All complete with starters.
Four 12", 60 v., 50 periods, Table Fans.

D.C.

One 80 v., 40 amp., 920 R.P.M.
One 250 v., 4 amp., 1675 R.P.M.
One 50 v., 20 amp., 1400 R.P.M.
One 110 v., 20 H.P., open-type Motor.

TRANSFORMERS.

Two 2 KW., 204 v., 25 v., Auto-transformers.
One 1 KW., 204 v., 50 v., Auto-transformer.
One 1 KW., 200 v.
Also quantity of D.C. Motor Starters, Iron-clad Switches and Fuses, &c. Can be inspected by appointment.

3284, ELECTRICAL REVIEW,
4, Ludgate Hill, London, E.C. 4.

GAS ELECTRIC PLANT.

FOR Sale, the following Gas Electric Plant, which is being superseded for a more extensive supply :—

One practically new Mond Gas Producer, 1200 B.H.P. continuously, for supplying Mond gas for driving gas engines, and supplying gas for furnaces, complete with Coal Handling Plant. Available now.

Three 105-KW. Hindley 5-cylinder vertical Gas Engines, direct coupled to 500-volt D.C. Generator. Available now.

Two 180-KW. do. do., in process of manufacture.

One 35-KW. do. do. just delivered.

Two 205-B.H.P., 500-volt Motors, 290 revs., suitable for direct coupling to Compressors.

One compound-wound Generator, 310 amps., 240 volts, 540 R.P.M.

One compound-wound Generator, 128 amps., 250 volts, 900 R.P.M.

For further information apply to MESSRS. TELFORD, GRIER AND MACKAY, LTD., 16, Carrick Street, Glasgow. 3190

LAMPHOLDERS, LAMPS, &c.

FOR Sale at reasonable prices, from stock, Lamp-holders, Metal Filament Lamps, Switches, Cables, Delcoblast Lamp Obscurer, &c., &c.

DAVIS, 11, Sun Street, E.C. 2. 2780

FOR SALE.—*Continued.*

MACHINERY FOR SALE.

NEARLY new "Victor" Automatic Turret Lathe, by Smith & Coventry, 9" centres, 8' bed, 2¾" hollow spindle.
Compound-wound, Bi-polar Dynamo, by Scott & Mountain, 220 volts, 450 amps., 550 revs.
7" Gwynnes' Centrifugal Pump, direct-coupled to motor, 460 volts, 40 amps., 1070 revs.
6' swing Triple-geared Boring and Facing Lathe, by H. Broadbent, Sowerby Bridge, with two self-act swivel slide rests.
Portable Electric Radial Arm Drilling Machine, by Kendal and Dent, 6' arm, 2½" spindle.
Portable Screw-driven Column Type Slotting Machine, with circular motion to column, about 4' 6" stroke.
Motor-driven Face Milling Machine, by Hetherington and Co., facing head 18" dia., motor 220 volts D.C.
Sellars' Patent Universal Tool Grinding Machine, to take tools 2½" by 2½".
Gear-driven Duplex Screwing Machine, by Dron & Lawson, with dies up to 2½" dia., Whitworth thread.
Profiling Machine, by Muir & Co., T-slotted table working service 12" by 15".

CATALOGUE of Stock MACHINERY. 2-3000 LOTS.
Free on Application. Inspection invited.
THOS. W. WARD, LTD., ALBION WORKS,
Tel.: "Forward, Sheffield." SHEFFIELD.

R. H. LONGBOTHAM & CO., LTD., WAKEFIELD,
and at Milburn House, Newcastle-on-Tyne.
Tel: { 44 Wakefield. / 867 Newcastle. Telegrams: "Engineer, Wakefield."

FOR SALE.

ONE 500-KW. triple-expansion Set, engine by Browett and Lindley, H.P. cyl. 17½", I.P. 25", L.P. 35" × 14" stroke. Single-phase Alternator, by British Westinghouse Co., 2100 volts, complete with exciter, &c.
One 225-KW. Generating-Set, engine tandem comp. type, 300 H.P., with Corliss Valve Gear, &c., B.T.H. Generator, 500 volts, compound wound.
One Parsons Steam Turbo, 1500 KW., 2-phase, 2000 volts, 50 periods. Complete with condensing plant.
One Willans-Parsons Steam Turbo Set, 1200 KW., with Alternator, 1200 R.P.M., 200 lbs. to sq. in., 11,000 volts, three-phase, complete with exciter, also condensing plant, air, and circulating water pumps, &c.
One Surface Condenser, by J. & H. McLaren, capacity 3000 cls. per hour, with circulating pump.
Two Exciters, 180 volts, 80/100 amps., 200 R.P.M. 5277

FOR SALE.

12-VOLT DYNAMO, 750 amps., two Commutators, 1150 revs. Almost new. Makers: Canning & Co.
140-volt Dynamo, 50 amps., 1030 revs. Makers: Greenwood & Batley.
Transformer, 3-phase, 500 to 220 volts, 50 periods; output, 15 K.V.A. continuously. Secondary pressure can be changed easily to 110 volts. Makers: Ferranti.
Alternating Motor Starter, large size. Makers: Erskine, Heap & Co.
55 yards double-wire armoured, 19/16, three-core Cable, Association; 2500 megohm grade.

Particulars from—

JAMES NEILL, LTD.,
1, College Place North,
Belfast.
5811

ELECTRICAL PLANT FOR SALE.

ONE 300-KW., 220/250-volt Generating Set, comprising "Howden" enclosed compound engine, coupled to compound interpole Generator.
One 500-KW., 220/250-volt Generating Set, comprising "Bellis" enclosed compound engine coupled to compound-wound Generator, and complete with condensing plant.
One 450-KW., 500-volt Set, as above, with or without condensing plant.

THE PHŒNIX ELECTRICAL CO.,
32—36, Broomielaw,
Glasgow. 2429

(Continued on next page.)

FOR SALE.—*Continued.*

MACHINERY, &c., FOR SALE.

FOR Sale, one 80-KW. 220-volt, 364-amp. Generator, 880 revs., interpoles, nearly new.
One General Electric Generator, compound-wound, 110 volts, 73 amps., 740 revs., resistance, meters, pulley, four-pole.
One E.C.C. Generator, four-pole, compound, 110 volts, 190 amps., 800 revs.
One Ruston Proctor, two-pole, shunt, 900 revs., 100 volts, 100 amps.
One Royce, two-pole, compound-wound, Generator, 40-KW., 110 volts.
One 220-volt. 1,000 revs., Motor, two-pole, shunt, 7 B.H.P.
One 2-H.P. Motor, 110 volts, 1,000 revs., four-pole, shunt.
One ½-H.P., 230 volts, 1,500 revs., shunt.
One 12½-H.P., Brooks, single-phase, 220 volts, 50 cycles, squirrel cage, new, rails, starter, pulley.
One 5-H.P., 500 volts, 1,440 revs., 50 cycles, three-phase, squirrel cage.
One 45-H.P. E.C.C. Motor, 500 volts, shunt, interpole, rails, starter, new.
Two 9-H.P. B.T.H., 500 volts, new.
One 27-H.P., 500 volts, 950 revs., interpole, rails, starter, Brush.
Three, nearly new, Pulsometer Pumps, Nos. 2, 3, 5.
One No. 41 Evans Steam Pump (Tonkins' Patent).
One new two-cylinder vertical paraffin or Petrol Engine.
Magneto ignition, extended Bed Plate.
One brand new Raw Hide Pinion, 12" dia., 6" face.
One 50-B.H.P. Oil Engine, built 1910, perfect condition.

3308, ELECTRICAL REVIEW, 4, Ludgate Hill, London, E.C. 4.

MACHINERY FOR SALE.

250-KW. Belliss-E.C.C. Set, 460 V., D.C.
225-KW. Willans-Siemens Set, 410 V., D.C.
75-KW. E.C.C. Machine, 110 V., D.C.
Electric Sinking Pump, 20 H.P., 220 V., D.C.
30-H.P. Laurence-Scott Motor, series wound, 460 V., D.C.
20-KW. Machine, 205 V., D.C.
Motor-Generator Set, 230 V., 30 amps., to 55/80 V., D.C.
31-H.P. Siemens S.C. Motor, 500 V., 3-phase, 50 cycles, 1,450 R.P.M.
600-H.P. E.C.C. Motor, 2,000 V., 2-phase, 50-period, 730 revs.
450-K.V.A. Generator, 110 V., single-phase, 25 cycles, 730 R.P.M.
D.C. and A.C. Starters.
Ammeters, Cable.

BURY ELECTRICAL PLANT CO., LTD.,
Monitor Works,
Bury.
'Grams: "Electric Bury." 'Phone: 676 Bury. 3131

LAMPS AND CARBONS FOR SALE.

ARC LAMPS.

18 Jandus enclosed Arc Lamps.
20 Gilbert enclosed Arc Lamps (Star).
32 Gilbert flame Arc Lamps (Beacon).
12 Johnson-Phillips enclosed.
26 Grosvenor open type.

CARBONS.

1,100 10 in., 16 m/m (cored).
1,000 10 in., 10 m/m "
500 18 in., 10 m/m "
450 18 in., 9 m/m "
500 12 in., 10 m/m (solid).
150 12 in., 6 m/m "

TREDEGARS LTD., 5/7, Brook Street, W. 1. 3194

FOR IMMEDIATE SALE.

THREE A.C. Generating Sets, comprising compound double-acting high-speed Engines ("Sentinel"), 220 B.H.P. each, coupled direct to 150-KW. Generators (Westinghouse), 440 volts, 25 periods, three-phase.

Two D.C. Generating Sets: compound, double-acting high-speed Engines ("Sentinel"), 45 B.H.P., coupled direct to 30-KW. Generators (Westinghouse), volts 250.

Four Durr Water-tube Boilers, 1614 sq. ft. H.S. each; working Press 120 lbs. per sq. in.

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FOR SALE.—*Continued.*

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(*Continued on next page.*)

FOR SALE.—*Continued.*

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CARRON Electric Cooker. No. 305. 200-220 volts, nearly new Complete with separate switchboard. With pilot lights, £15. Apply, S. E. HUNT, Electrician, 6, The Exchange, Brighton Road, Croydon. 6077

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FOR Sale, Converter or Charging Set, 200 volts, 13·5 amps., 115 volts, 20 amps., with starter, switchboard and connections.—WILLIAMS & SONS, 37, Queen Victoria Street, London. 3295

FOR SALE.—*Continued.*

FOR Sale, Electric Light Plant, Laurence, Scott Dynamo, 55 amp., 100 v., 860 R.P.M., with slides, condition as new. Slate switchboard with meters, switches and fuses. 8-H.P. Steam Engine, belting, pulleys, &c. Can be viewed perfect running order (Midland Counties).—6056, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

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FOR Sale, Motor-Generator, by the G.E.C., 500 volts, 225 amps., with two series-wound boosters, 110 volts, 400 amps., 650 R.P.M.—WILLIAMS & SONS, 37, Queen Victoria Street, London. 3296

FOR Sale, new Motor-Generator, suitable for welding, and comprising: 80-H.P., 440-volt, 35-cycle, 3-phase, slip-ring Motor, coupled to 60-KW., 110-volt, D.C. Generator.—THE PHŒNIX ELECTRICAL CO., 32/36, Broomielaw, Glasgow. 3123

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FOR Sale, two Marine-type dry-back Boilers, 13 ft. × 11 ft., 180 lbs. working pressure.—BOX 15, c/o Dawson's, 121, Cannon Street, London, E.C. 4. 3299

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FOR Sale, 8, 18, 45 and 90-H.P., 220-volt, D.C. Motors.—THE PHŒNIX ELECTRICAL CO., 32/36, Broomielaw, Glasgow. 3208

FOR Sale, 10/12-B.H.P. Motor, 500 volts, 750 revs., shunt-wound 4-pole, protected type.—JOSEPH PUGSLEY, & SONS, LTD., Lawrence Hill, Bristol. 3321

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FOR Sale, 60-KW. 110-volt, 75-KW. 240 volt, 110-KW., 220-volt, 150-KW. 440-volt, and 150-KW. 500/550-volt, Multipolar Generators, for belt or rope drive. All modern machines and cheap.—THE PHŒNIX ELECTRICAL CO., 32/36, Broomielaw, Glasgow. 3207

FOR Sale, 60-KW., 110-volt, 700-R.P.M., shunt interpole Generator; also 110-KW., 500-R.P.M. ditto, for belt or rope drive.—THE PHŒNIX ELECTRICAL CO., 32/36, Broomielaw, Glasgow. 3118

FOR Sale, 80-H.P., 440-volt, 25-period, 720-R.P.M., 3-phase, slip-ring Motor, complete with Ellison Control Gear.—THE PHŒNIX ELECTRICAL CO., 32/36, Broomielaw, Glasgow. 3124

FOR Sale, 110-KW., direct-coupled, steam Generating Set, Siemens type dynamo, 220 volts. Immediate delivery.—WILLIAMS & SONS, 37, Queen Victoria Street, London. 3293

FOR Sale, 110-KW., 220-volt, 500-R.P.M., multipolar, three-bearing Generator.—THE PHŒNIX ELECTRICAL CO., 32/36, Broomielaw, Glasgow. 3121

FOR Sale, 120-H.P. D.C. Motor, by the G.E.C., shunt wound, 500 volts, 650 R.P.M., now fixed. Immediate delivery.—WILLIAMS & SONS, 37, Queen Victoria Street, London. 3297

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FOR Sale, 180, 220 and 500-H.P., 440/500-volt Motors, all slow speeds.—THE PHŒNIX ELECTRICAL CO., 32/36, Broomielaw, Glasgow. 3119

FOR Sale, 210-H.P. Motor, D.C. 460 volts, 425 R.P.M., Multipolar with interpoles.—WILLIAMS & SONS, 37, Queen Victoria Street, London. 3298

FOR Sale, 996 yd., new, 4-core, 110/24, S.W.G., Cab Tyre Sheathed Cable, in three lengths.—THE PHŒNIX ELECTRICAL CO., 32/36, Broomielaw, Glasgow. 3122

FOR Sale, 1100 yards 1/18 600-megohm Association Cable.—6086, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

(Continued on next page.)

FOR SALE.—*Continued.*

GARDNER 5-horse vetical petrol paraffin Engine for sale, fitted with H.T. Bosch magneto, vaporiser, circulating pump, speed 800, suitable for direct coupling to dynamo, nearly new.—A. RUSHWORTH, Chigwell Row, Essex. 6046

GAS Engine for Sale. Special bargain. National "T" type Gas Engine, 35 B.H.P. with magneto ignition and self-starter, complete with tanks, &c., as now fixed. This engine is in very excellent condition all through and guaranteed perfect in every way, is only for sale on account of the factory being transferred. Can be seen running in Bristol. Price for same on site, purchaser to remove, £208.—COOK, 5, Elton Road, Bishopston, Bristol. 3253

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OFFERS wanted for Burnt-out Drawn Tungsten Wire Lamps; also tops.—6108, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

ONE Crompton Dynamo, No. 1922, bi-polar, open type; amps. 65, volts 110, revs. 1260. Also one 5-B.H.P. Westinghouse Motor, serial 120169, D.C. current, shunt wound, 460 volts, 1340 revs. Will take £55 for the two, or would sell separately.—Apply, MARK MAYHEW, LIMITED, Battersea Flour Mills, 112, Church Road, Battersea, S.W. 11. 6085

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ONE 70-H.P. Motor, 500 volts, 3-phase, 50 periods, 600 R.P.M., with reducing gear, brush lifting and short circuiting device. One 3-pole Oil Switch, with no-volt and overload coils, and fitted with remote control; ammeter, reading amps. and horse-power, all on black polished slate panel. One Oil Rotor Starter. The whole in excellent condition and ready for immediate delivery.—FRYER AND HARTLEY, Slack Street, Rochdale. 6122

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STEAM Set, direct-coupled, 26-KW., 105 volts "Silvertown" Dynamo, Shanks engine, 65 lbs. steam; three No. 4 electrically driven Keith-Blackman, high-pressure, cupula blowers, 2600 cubic-feet at 22" W.G.; 460/500-volt, D.C., 15-H.P., interpolar motor; all perfect condition.—3317, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

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460-VOLT Dynamos or Motors for sale, 120, 163, and 240-amp. sizes.—3139, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

550/600-volt, 3-phase, 50-period, 75-K.V.A. Alternator for sale.—3138, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

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STOCKS of Cable, Bell and Lighting Accessories, Lamps, &c., purchased for cash. Large and small quantities.

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DYNAMOS AND MOTORS WANTED.

DYNAMO, Compound Wound, 220 volts, D.C., 150 amps., and suitable Shunt Regulator.

1-2-3-H.P., 220-volt Motors, D.C. Shunt, would purchase if windings burnt out.

4 to 10-H.P. ditto, but must be in good condition and running order. Starters for above motors also required.

State full particulars, condition, make, type, speed, pulleys, &c. Prices delivered Burnley.

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HOT Plate, Electric, 100 volts, about 30" × 18", new or second-hand.—HAREWOOD, Rickmansworth. 6052

LIGHTING Accessories, Fittings, &c., wanted for cash; state prices.—3257, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

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WANTED, at once, two second-hand, 300-KW., 3-phase Transformers (or nearest size), 520/10,000 volts, 50 periods, for a motor load of about 75 power factor, preferably of the oil-cooled type, and must be guaranteed to work perfectly in parallel. Best possible price and delivery and where can be seen working.—3289, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

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WANTED, direct-coupled Set, about 50/75 KW., 220 or 440 volts, D.C., preferably the latter. Full details and price must accompany offer.—2828, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

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WANTED, Lister-Bruston Auto Plant, second-hand, about 20 lights.—Full particulars to PARSONS, King Edward Street, Hull. 3219

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WANTED, small Dental Motor, 5 H.P., 230 v., D.C.; also 230-v. Buffing and Polishing Motor.—PARSONS, King Edward Street, Hull. 3310

(*Continued on next page.*)

ARTICLES WANTED.—*Continued.*

WANTED, Steam Pressure Recorder, CO_2 Recorder and Bomb Calorimeter (Mahler preferred), in good condition.—3290, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

WANTED to hire, one 15-H.P. or two 8-H.P. 440-volt D.C. motors for two or three months.—PARSONS, King Edward Street, Hull. 3311

WANTED, 5-H.P., 400-volt Motor and Starter, 75-volt, 16-amp. Dynamo, 26" split pulley, 4" face, 1¼" bore.—HORSWILL, Guilden, Sutton, Chester. 6076

WANTED, 300-H.P., 400-volt, 3-phase, 50-cycle, slip-ring Motor, 325/367 revs.—Full particulars to 3251, ELECTRICAL REVIEW, 4, Ludgate Hill, London.

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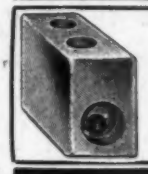

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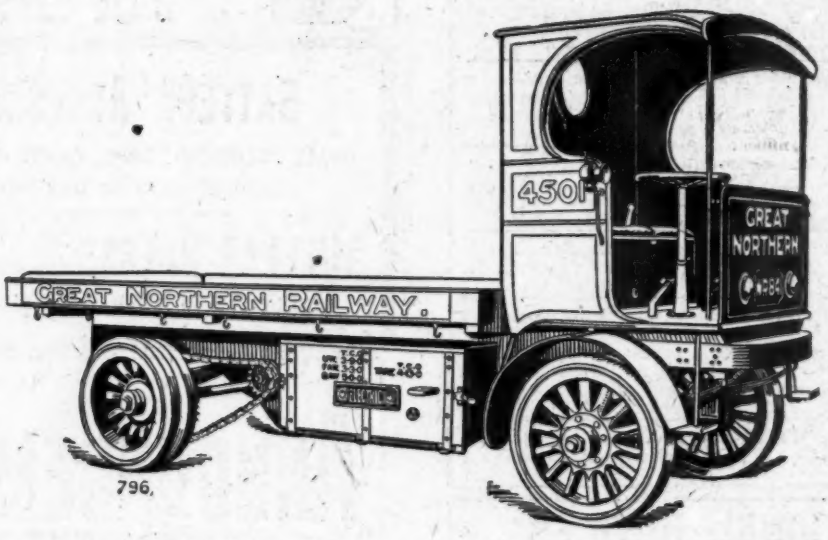

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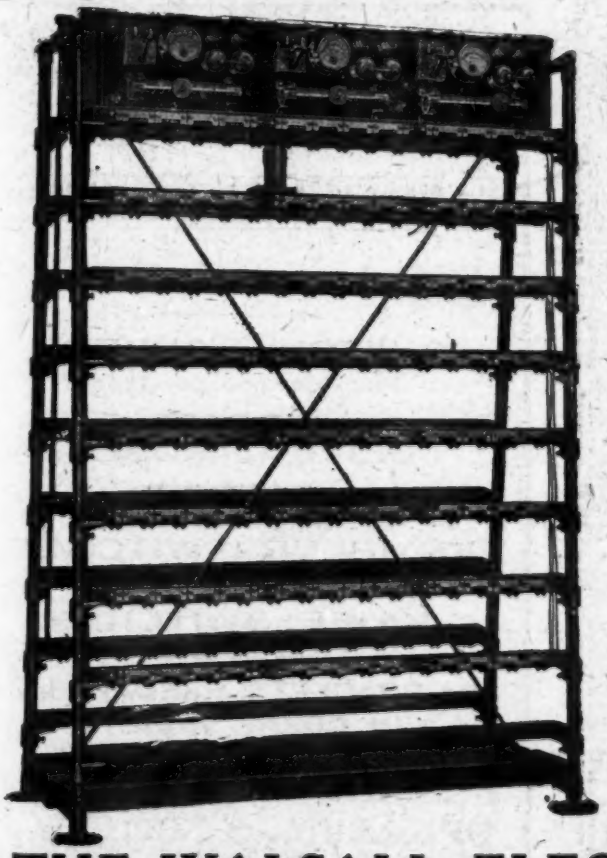

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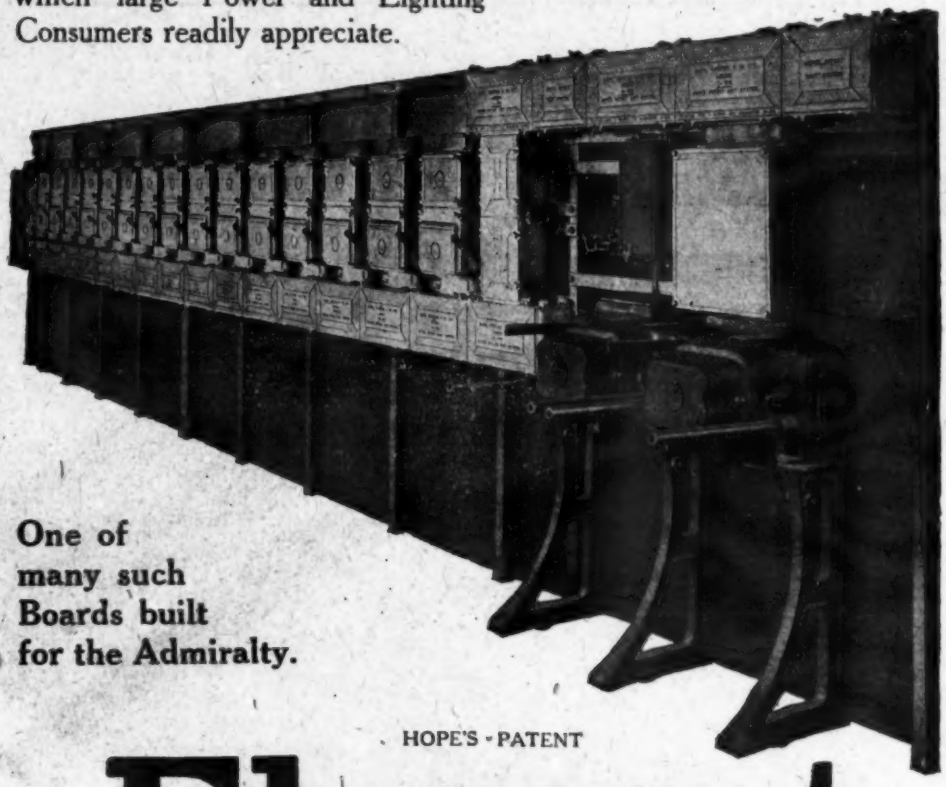

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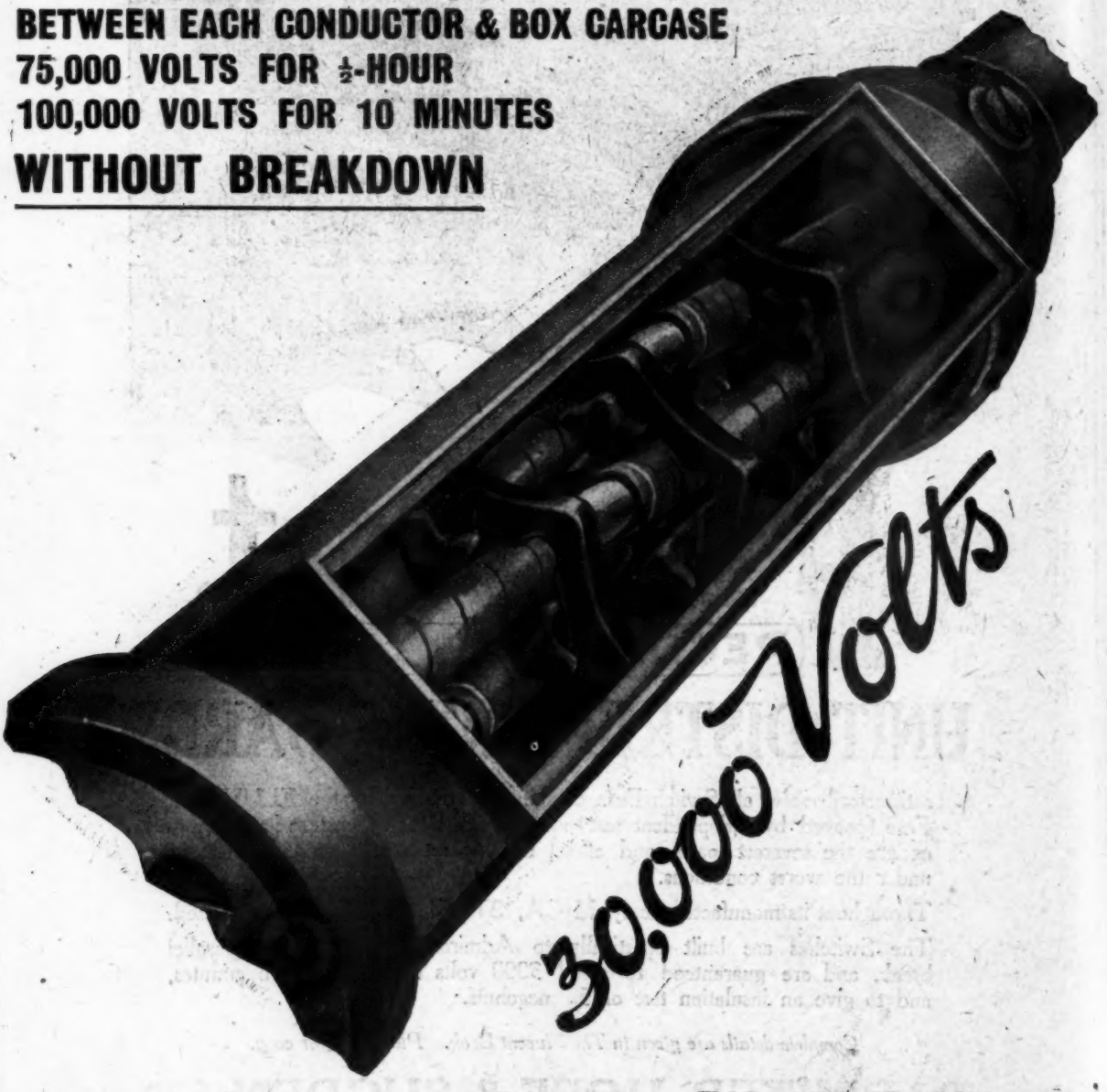

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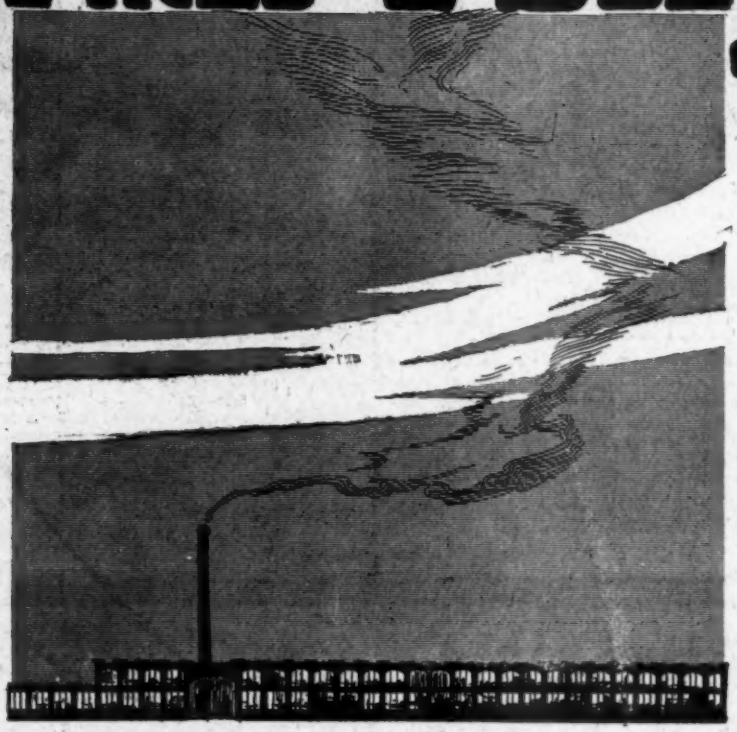

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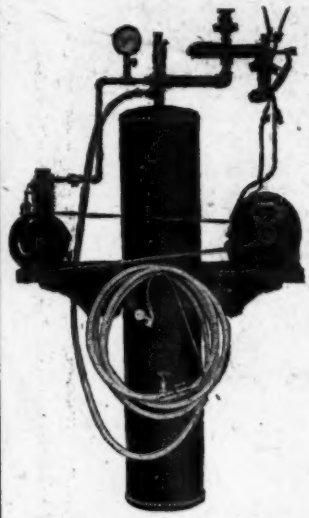

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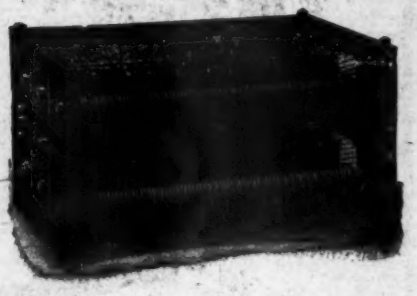

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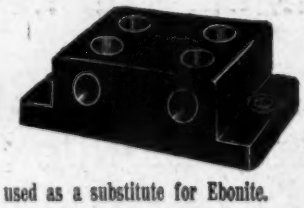

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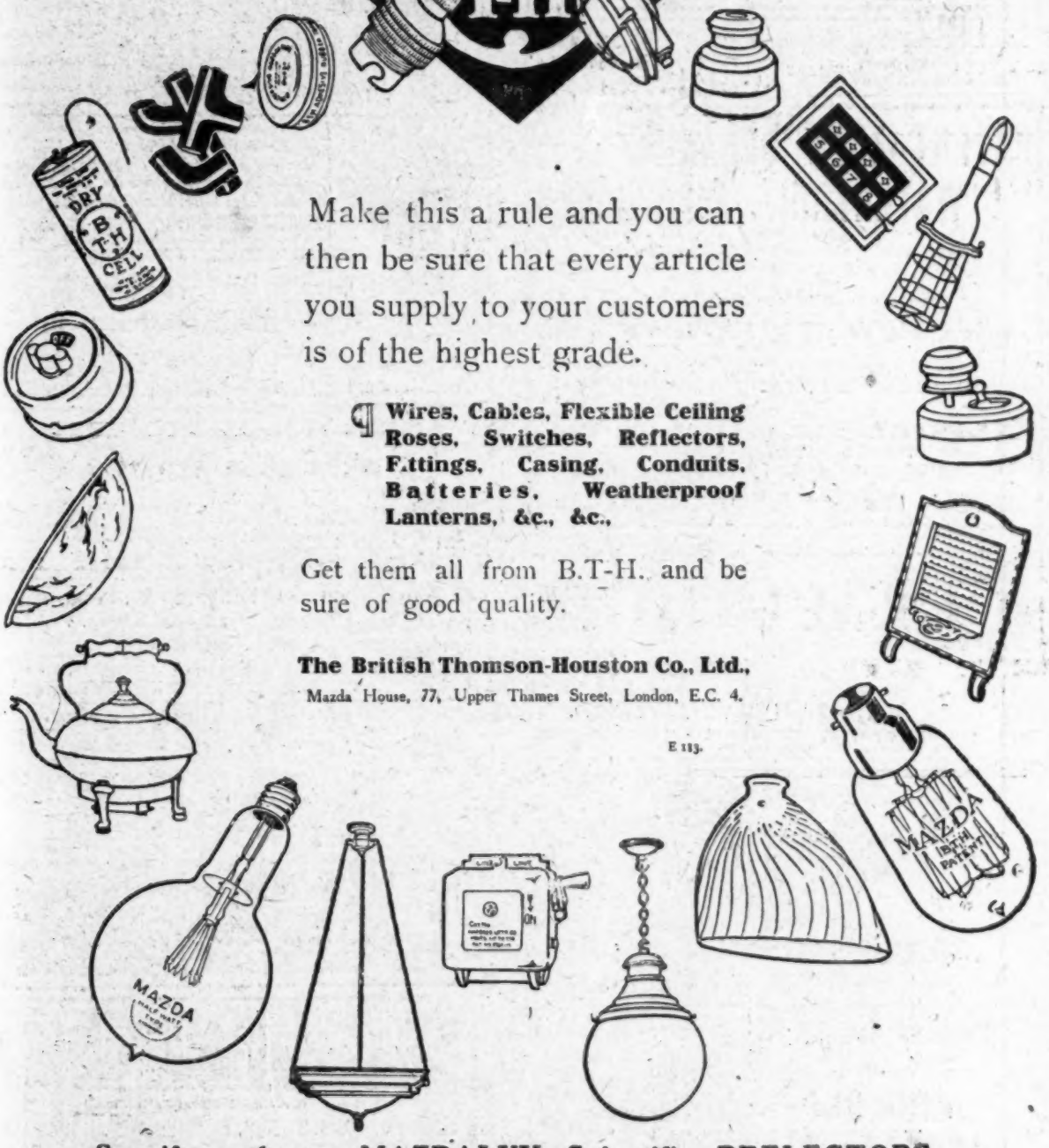

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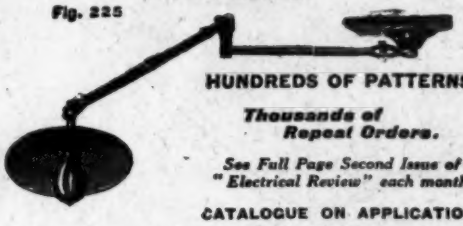

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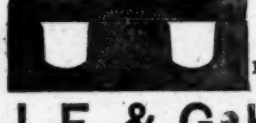

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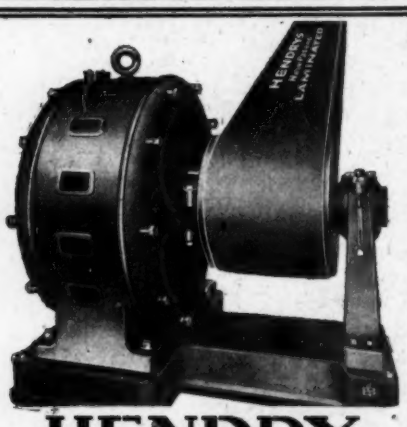

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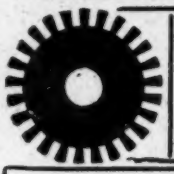

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ADHESIVE TAPE & CHATTERTON COMPOUND.

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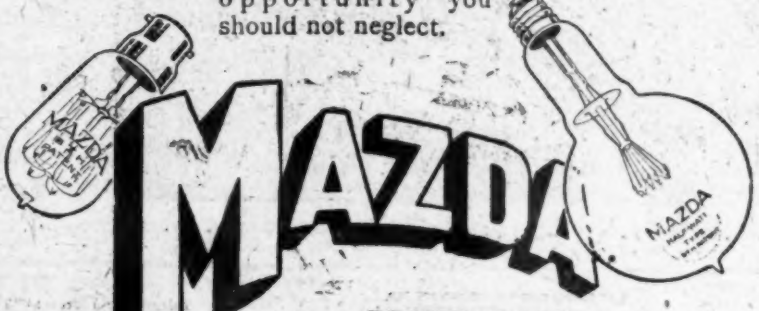
Goodwill

The Contractor who neglects no opportunity to cultivate the goodwill of the consumer builds up his connection on the sound basis that gives it permanency and means development. One such opportunity exists in the Electric Lamp. By installing Mazda Lamps in conjunction with Mazda Lighting Equipment such as the Mazdalux Scientific Reflector, the contractor achieves for the consumer the most satisfactory lighting results possible, giving him better light at a lower cost than he could otherwise obtain. It is a service that must stimulate goodwill. It is an opportunity you should not neglect.



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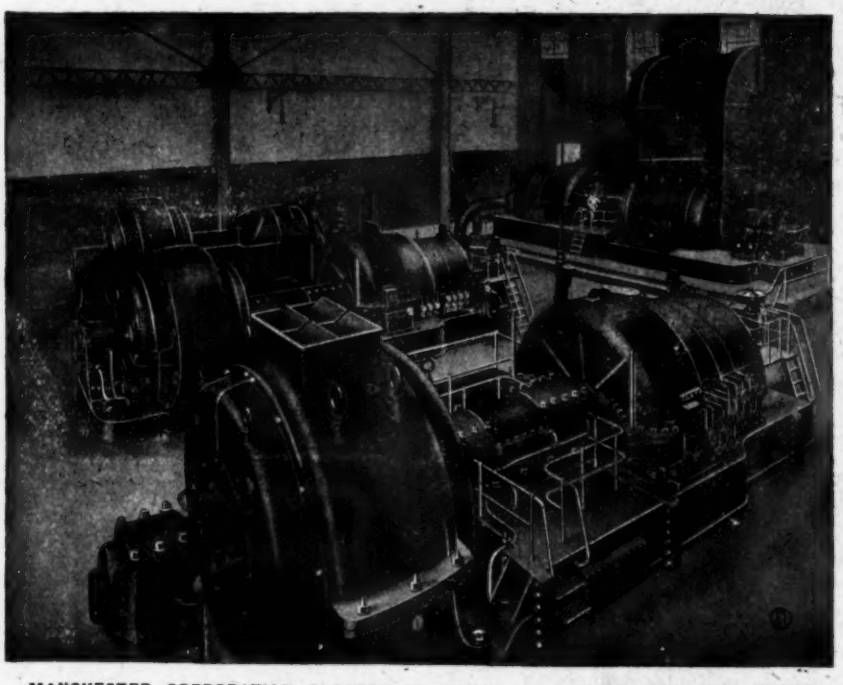

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of High, Low and Mixed Pressure, and Pass Out Types,
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HIGH-SPEED STEAM ENGINES,
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Fans for Suction Draught, Ventilating, &c.
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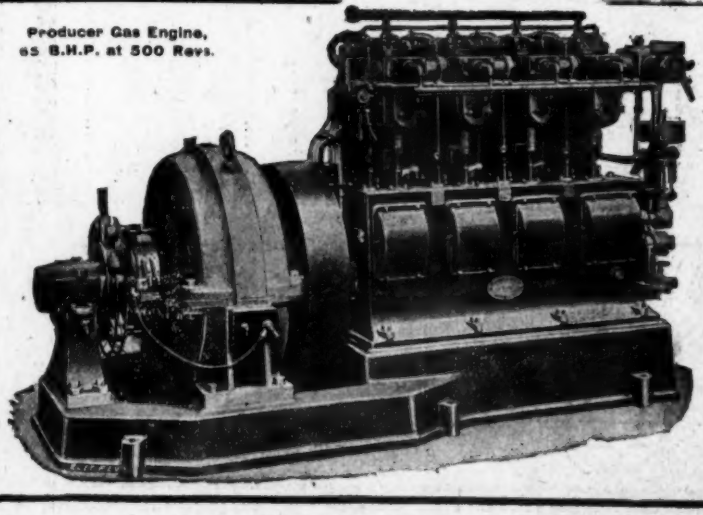

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Power Stations,
Large and Small,
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Large and Small.
Mines and Consumer's Premises,
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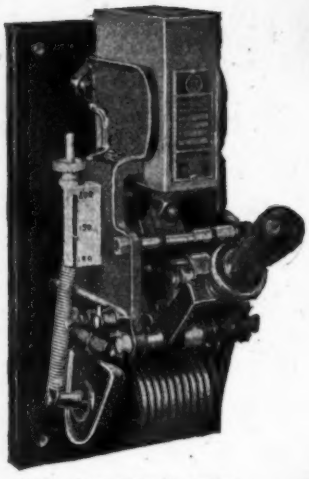
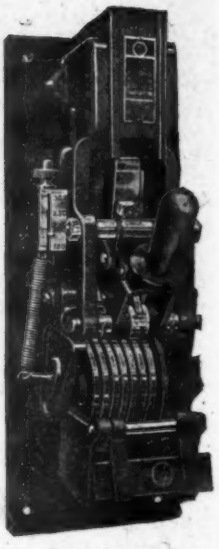
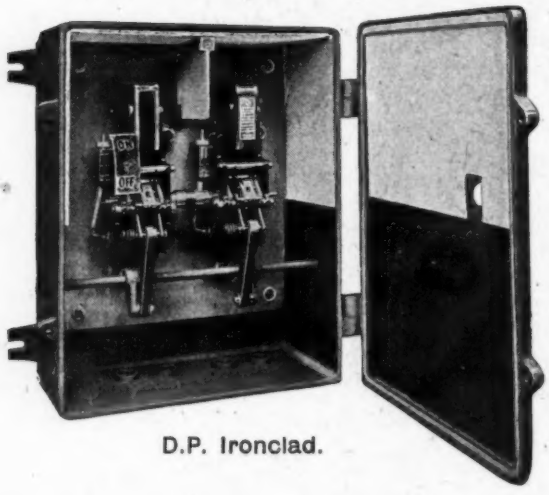


S.P. Overload only.



S.P. Overload and No Volt.



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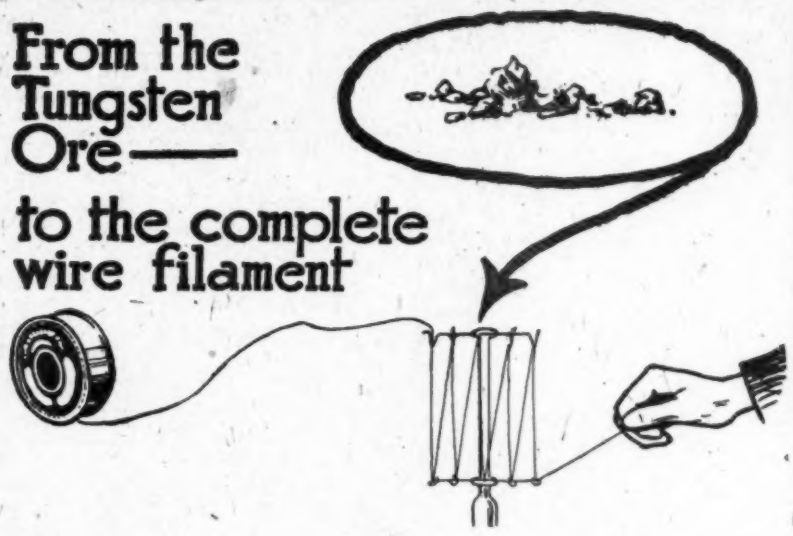

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Process by process the work is carried out by British labour in our London Works. We do not buy the Tungsten Powder or the Tungsten Rod.

We begin with the Ore, refine and reduce it, work it into rod, swage it down, and finally draw down into the finest filaments.

We are Tungsten and Molybdenum experts.

See that your lamps are made with

"Pladuram" Wire

which is the only sure guarantee of a British product from start to finish.

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SIMPLEX
STEEL REFLECTORS
FOR
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are Unequalled. They are Rust-proof, Strong, Efficient and Inexpensive.

With these Reflectors properly installed, every ray of light is directed to useful work, without glare.

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Write for Catalogue No. 678.

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96, Whitechapel, Liverpool.
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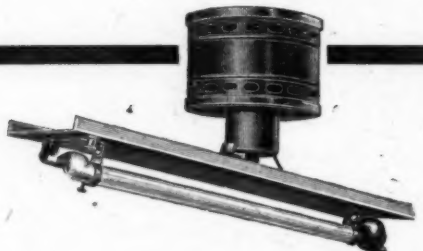

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Write for a copy of List, which gives full particulars.

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"BANQUO" SYSTEM (Registered).

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"BANQUO" SAFETY INTERLOCKING COMBINED WATERPROOF SWITCH AND 3-PIN PLUG.

We would WARN our Friends against Unsatisfactory Imitations of "BANQUO" Switches and Plugs.

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The Plug is Gun Metal fitted with Cord Grip to take Cab Tyre or our Tough Rubber-sheathed Flexible Cord specially manufactured for use with this Plug.

Prices on application.

"BANQUO" IRON-CLAD DISTRIBUTION SWITCH SYSTEM.

Supplied Single or Double-Pole

This System will commend itself to engineers as an improvement on the practice of mounting a number of switches inside the same box as the fuseboard and in place of straggling single units. The switches are mounted on one iron base, this being usually fitted in proximity to the distributing fuse-box. The switches are foolproof, and saving is effected in cost and labour. The words "ON" and "OFF" are cast on the lid, and the switch handle is of cast gun-metal, giving a substantial yet neat appearance. The boxes can be drilled and screwed to requirements, and there is ample space inside cases for safety and ease in wiring.

WE CAN SUPPLY 'BANQUO' SWITCHES WITH LOOSE OR REMOVABLE KEYS, 1/4 per way extra.

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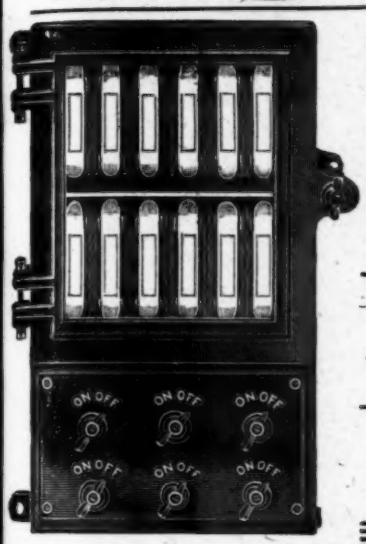
Number of Single Pole 5-Amp. Switches.											
1	2	3	4	5	6	7	8	9	10	11	12
5/0	9/4	14/-	18/8	23/4	28/-	32/8	37/4	42/-	46/8	51/4	56/-

Prices for Double-Pole and 10-amp. Switches on application.



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An improved form of the very latest and best possible type. These boards have been supplied on the best class of work where low price has not been a consideration, but reliability and quality the only factors. The Fuses are our B.O.T. Sunk Type, and have all current-carrying metal parts totally protected. The Switches are made up in banks according to the desired number; they are in a dust and damp-proof compartment, with the handles on the front of panel.

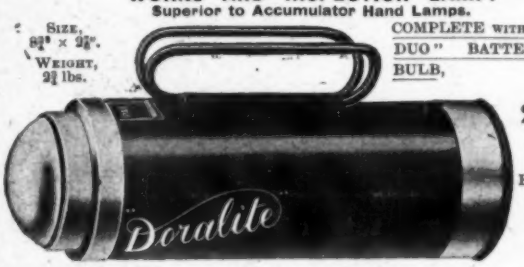
No. of Ways.	5 Amp. per Way.	10 Amp. per Way.
2	£1 8 0	£1 16 0
3	£1 6 0	£1 16 0
4	£1 5 6	£1 12 0
5	£1 5 0	£1 12 0
6	£1 4 0	£1 12 0
7	£1 4 0	£1 12 0
8	£1 4 0	£1 12 0

The "DORALITE" HIGH GRADE BRITISH MADE

WORKS AND INSPECTION LAMP.

Superior to Accumulator Hand Lamps.

SIZE, 8½" x 2½". WEIGHT, 2¾ lbs.



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21/- EACH (Subject).

FROM 100 TO 150 HOURS' LIGHT.

The "Doralite" Lamp is of handsome appearance, strong construction and best finish, and is highly recommended for inspection and other service. The "Volex Duo" Battery supplied holds up well in stock, and is quite suitable for export.

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WE MANUFACTURE DETAIL APPARATUS, including:—

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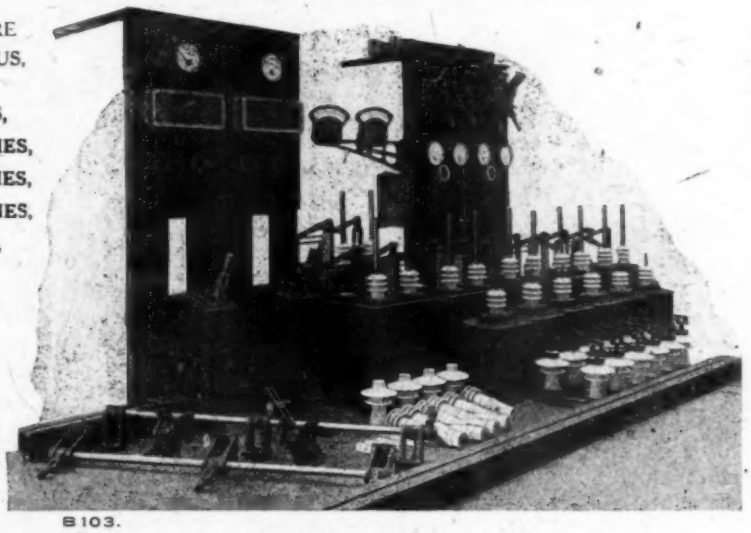
OIL-BREAK SWITCHES,
IRONCLAD SWITCHES,
IRONCLAD FUSES,
L.T. FUSES.
H.T. FUSES,
etc., etc.,
and
REACTANCE COILS.



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E.H.T. & L.T. WORKS SUB-STATION SWITCHGEAR

for Converting from 30,000 Volts Three-Phase to 500 Volts D.C.

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Telephones: 329 & 330 Openshaw.
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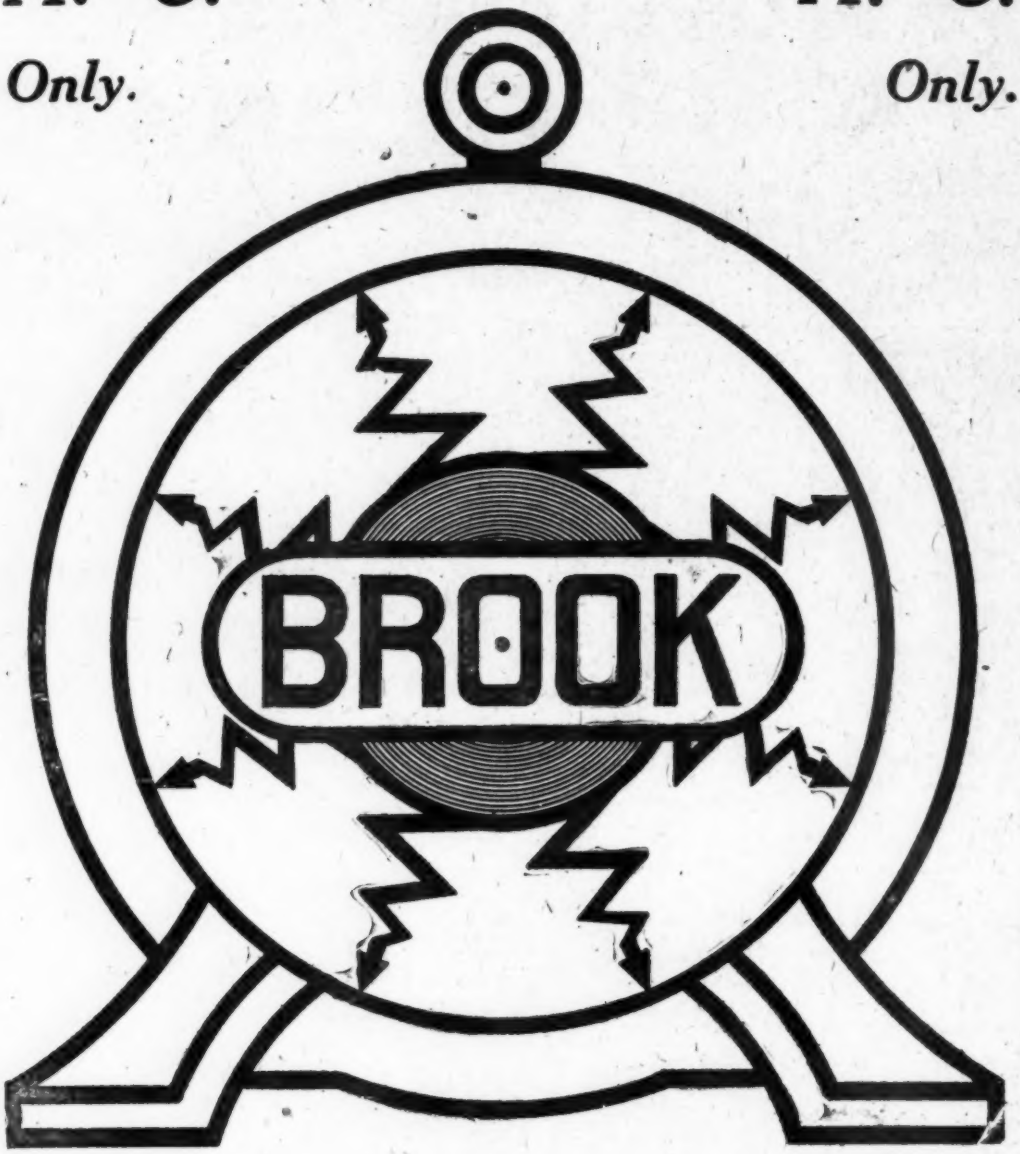
A. C. *A. C.*

Only. *Only.*



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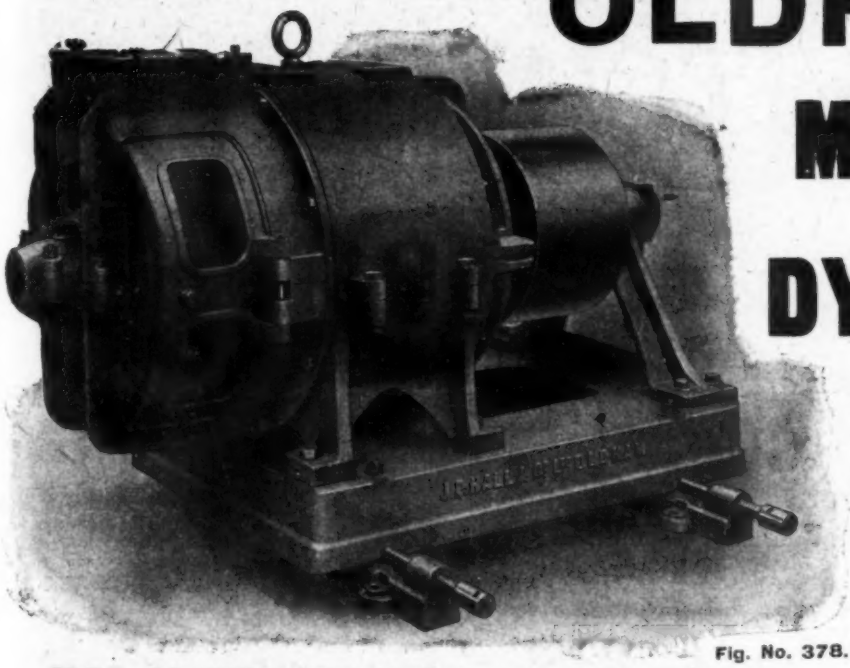

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Direct or Alternating Current.

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Fig. No. 378.

50-H.P. D.C. MOTOR WITH BEDPLATE AND OUTER BEARING.

ALTERNATING CURRENT MOTORS

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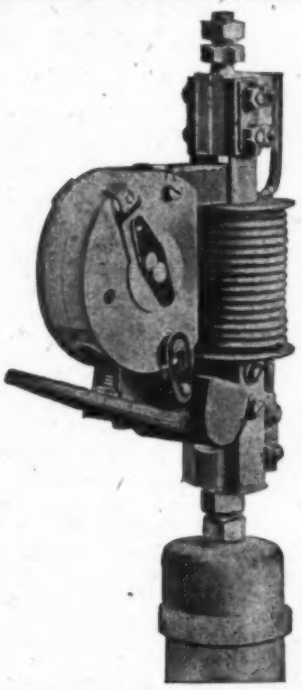

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Time of Trip is independent of Load current. No Series Transformer Required. Over 2,000 in use.

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FIREPROOF. ***NON-HYGROSCOPIC.*** ***HIGH ELECTRICAL RESISTANCE.***

WITHSTANDS HEAT, ATMOSPHERE, HOT TRANSFORMER OIL, ALKALIES, OZONE, WATER, &c.

Rich black colour, and readily polishes.

HIGH ELECTRICAL RESISTANCE,
13,000 Volts per Millimetre.

Does not soften under any heat.

Moulded readily during manufacture into any shape.
Moulded on iron pins and into caps, etc.
Can be applied to metal parts.

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SIZE
UP TO
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THE SILUMINITE INSULATOR CO., LTD.,
Telephone: SOUTHALL, 59. **The Green, Southall, Middlesex.** *Telegrams: "SOUTHALL, 59."*

Printed by WILLIAM CATE, LTD., 147-150, Saffron Hill, E.C. 1, and Published by the Proprietors, H. ALABASTER GATEHOUSE & KEMPE, 4, Ludgate Hill, London, E.C. 4.

Trade Announcements.—Sir W. G. Armstrong, Whitworth & Co., Ltd., of Openshaw, Manchester, have now appointed the following district representatives throughout the country, and have opened permanent district offices in connection with their tool steel and small tools business:—

London and Southern District:—Representative, Mr. Ernest Wilson, 8, Great George Street, Westminster, S.W. 1. Telegrams: "Zigzag, Parl, London." Telephone: 4010 Central.

Scotland and Ireland.—Representative, Mr. A. S. Jones, 137a, St. Vincent Street, Glasgow. Telegrams: "Tulesteel," Glasgow. Telephone: 2214 Central.

Midland District.—Representative, Mr. Walter Todd, 158-161, Great Charles Street, Birmingham. Telegrams: "Waltod, Birmingham." Telephone: 417 Central.

North-Eastern District.—Representative, Mr. J. D. Smith, Pilgrim House, Pilgrim Street, Newcastle-on-Tyne. Telegrams: "Crucible, Newcastle-on-Tyne." Telephone: 241 Central.

Lancashire and Wales.—Representative, Mr. T. W. Etchells, 5, John Dalton Street, Manchester. Telegrams: "Hispeed." Telephone: 809 Central.

The executors of the late Mr. E. J. Philpot, electrical engineer, of Canterbury and Ramsgate, announce that the business will be continued as usual.

Book Notices.—*Electric Furnaces.* Reprinted from the *Transactions* of the Faraday Society. Pp. 37; 18 figs. London: The Society. Price 3s. 6d.—A general discussion took place on electrical furnaces, at a meeting of the Society held on February 14th, at Manchester. Mr. H. Etchells, B.Met., M.Inst.Met., contributed the first paper to the symposium, entitled "Application of Electric Furnace Methods to Industrial Processes." Mr. J. Bibby, M.Sc., read a paper on "Electric Steel Refining Furnaces," and a paper by Mr. Frank E. Hill and Mr. A. P. M. Fleming on "Control of Electric Furnaces" was presented by Mr. Hill. The subject was then thrown open for general discussion. These papers, including the discussion, have now been brought together and reprinted under one cover, and we welcome them as timely. The papers are most interesting, containing important suggestions for the improvement of steel manufacture. In many branches of industry progress has been stimulated by the war to a marked degree, and when free discussions of these developments become possible, it will be seen that the advances of electro-metallurgy in Great Britain have been remarkable.

"*Proceedings* of the American Society of Civil Engineers." Vol. XLIV, No. 8. October, 1918. New York: The Society, 33, West Thirty-Ninth Street.

"*Transactions* of the Institution of Engineers and Shipbuilders in Scotland." Vol. LXII, No. 1. November, 1918. Glasgow: The Institution.

"Industrial Electrical Measuring Instruments." By Kenelm Edgcumbe. Second Edition. Pp. xvi. + 414; 260 figs. London: Constable & Co., Ltd. Price 16s. net.

LIGHTING AND POWER NOTES.

Abercanaid.—Price Increase.—The electricity consumers at Abercanaid and Pentrebach have appointed a Committee to report on the increase of charges for electricity by 100 per cent. above pre-war charges.

Barnes.—Loan Sanction.—The U.D.C. has received the sanction of the L.G.B. for the borrowing of £5,500 for extensions in connection with the electricity undertaking.

Bedford.—New Power Station Opened.—On November 9th, the new Corporation power station was formally opened. A large party attended the ceremony at the invitation of Councillor W. E. Sowter, chairman of the Electricity Committee.

Cirencester.—Price Increase.—The Electric Supply Co. has applied to the B. of T. for powers to increase the price of electricity from 11s. 8d. for any amount up to 20 units per quarter, and 7d. per unit beyond, to 11s. 3d. up to 15 units, and 9d. per unit beyond.

Darlington.—Enemy Contracts.—The T.C. has settled the question of the unfinished contract by a German firm for the erection of a cooling tower at the electricity works by accepting the sum of £204 and 50 per cent. of the remainder from the Official Receiver, which is almost as much as the Council claimed.

Deal and Walmer.—The B. of T. has extended the Deal and Walmer Gas and Electricity Act of 1914 for one year.

Edinburgh.—Year's Working.—The annual accounts of the Corporation electricity department show that for the year ended May 15th last the income amounted to £167,065 and the expenditure to £106,823. Redemption of debt absorbed £39,323; interest on loans, £15,694; income-tax, £7,613; and other capital charges, £568, the gross surplus of £60,241 being converted into a net loss of £2,957. This has been met from the reserve fund, which now stands at £99,838. Units sold during the year totalled 20,945,404, against 17,997,251 in the preceding year, and included private lighting, 9,040,892, against 8,651,321; power, 11,470,080, against 9,050,990; traction, 130,357, against 118,840; street arc lamps, 228,000, against 93,167; street incandescent lamps, 76,075, against 82,933; 3,156,114 units were used on the works, against 2,528,305; and 2,102,248, against 1,952,851, were unaccounted for. The total capital expenditure on the undertaking amounted to £1,201,626, of which £7,767 was incurred during 1917-18.

Proposed Extensions.—The E.L. Committee has appointed a deputation to urge the Ministry of Munitions to grant facilities for the construction of the new power station at Portobello; meanwhile, the alterations at Dewar Place are to be proceeded with.

Glasgow.—Proposed Extensions.—We are now able to state that at a meeting in September of the Electricity Committee, the engineer reported that since ordering the fourth turbo-alternator set for the new generating station at Dalmarnock in February last, he had received applications for additional supplies of electricity of approximately 20,000 H.P., and that, subject to Messrs. Beardmore & Co. being granted certificates by the Ministry of Munitions for a supply of between 10,000 and 15,000 H.P. for furnaces, an additional generating set of 15,000 KW. should be ordered. The estimated cost of the turbo-alternator is £100,000, and its installation will complete half of the Dalmarnock station; the estimated cost of the equipment of the second boiler house is £150,000. The Committee recommended that, subject to the certificates being granted to Messrs. Beardmore & Co., tenders for an additional turbo-alternator set, with accessories, be obtained, and that the equipment of the second boiler house at Dalmarnock be proceeded with when the turbo-alternator has been ordered.

Guernsey.—Explosion.—On the morning of the 8th inst. an explosion occurred at the St. Sampson's power station of the Guernsey E.L. & P. Co. The gable of the building was blown away. The cause is unknown, but thought to be due to the ignition of an accumulation of gas in the basement.

Hetton.—Street Lighting.—The U.D.C. has appointed a deputation to interview the manager of the Sunderland District Electric Tramways Co., with reference to the lighting of the streets.

Huthwaite.—Mains Extensions.—The U.D.C. has granted the New Hucknall Co. permission to erect an overhead cable to supply electricity to the Institute.

Lighting Restrictions.—The Coal Controller has issued a statement to the effect that the Household, Fuel, and Lighting Order is still in force, and that illuminations, shop-window lighting, and outside lighting cannot be permitted until reserve stocks of coal are in existence and the mines are producing sufficient for requirements. The notice states that because the street lighting restrictions have been modified, and hotels and theatres were allowed to remain open later last week, private consumers appear to be under the impression that they may use more light; this is not the case, and unless the economy is kept up, there will be hardship in the early part of next year.

According to the *Irish Independent*, the Chief Secretary for Ireland has admitted that the early closing rules made under the Irish Lighting Regulations Order are unreasonable and impracticable, and he has promised to take steps to have them revised. The Dublin Chamber of Commerce is asking for some means of quick and easy appeal to some impartial tribunal in cases of individual hardship. As to the Corporation lighting restrictions on private consumers, it is stated that a hard and fast rule is unfair, as is also the adoption of the 1914 consumption as the basis of comparison in all cases.

Minimum Charges.—In the House of Commons Sir Albert Stanley, in a written answer to Mr. Jacobson, says:—I am aware that some electric supply bodies are enforcing a minimum charge. The right to make thi charge is a statutory one which is commonly conferred on electric supply bodies whether companies or local authorities, who are under the obligation to maintain a general supply sufficient for the use of all consumers, and the object of the provision is to ensure to them a reasonable return for the expenditure incurred. The charge is, as a rule, small, and I should be sorry to think that there are many persons to whom it acts as an inducement to consume energy unnecessarily. I am taking steps to suspend the charge as far as possible when application is made for a revision of price under the Statutory Undertakings (Temporary Increase of Charges) Act of this Session, but to do it generally would require further legislation, which I am not prepared to recommend to the House.

Proposed Joint Supply.—At a meeting of the Derby T.C. it transpired that the two engineers appointed to report on a scheme for the linking-up of the electricity supply systems of nine towns in the Midlands (referred to in our last issue) were Sir John Snell and Mr. Worthington; the fee is to be 1,000 guineas each, and a further £2,000 is to be expended on the preparation of a report. It was stated that the matter was urgent, as coalowners and others were preparing individual schemes.

Redditch.—Year's Working.—For the year ended March 31st last, the income of the Corporation electricity department amounted to £20,610 and the generation and distribution costs to £15,289, the net profit being £338; £2,000 was placed to reserve for capital repayments, part of which was met from the rates.

Skelton and Brotton.—Street Lighting.—The U.D.C. has arranged to resume electric street lighting.

South Lancashire.—New Installations.—It is said that big contracts were placed on Saturday, and others were to be ratified this week, for opening new coal mines and installations of electrical plant in various parts of South Lancashire.

Sunderland.—Price Increase.—The E.L. Committee has recommended that the war charges for electricity for power purposes be increased from 15 per cent. to 33⅓ per cent. from the November meter readings, and that war charges to L.T. consumers, except at the domestic rate, be increased by 10 per cent. to 20 per cent.

Tiverton.—Proposed Street Lighting.—Sir Ian Amory has offered to provide public electric lighting in the town by the utilisation of water power; the T.C. is considering the scheme.

TRAMWAY AND RAILWAY NOTES.

Ashton-under-Lyne.—Proposed Loan.—The T.C. has decided to apply to the B. of T. for sanction to borrow £15,309 in connection with the proposed extension of the tramway depôt in Mossley Road.

Australia.—Melbourne.—According to the *Financier*, an electric train has been run between Newmarket and Essendon, with complete success.

Birmingham.—For sticking to their work during the armistice celebrations, tramcar drivers and conductors have been given an extra day's pay.

Blackpool.—Year's Working.—The report of the manager of the Corporation tramway department for the year ended March 31st last states that, in spite of the increased operating costs, the percentage of working expenses to the total income only increased from 56·4 to 57·36 per cent. The manager is opposed to the system of annual contract tickets, and is of opinion that, unless some revision of charges is made, this class of passenger will dominate the system to the detriment of the ordinary fare-paying passenger. In July last year the lease of the Squire's Gate-Station Road line of the Blackpool, St. Anne's and Lytham Tramways Co. expired, and has since been worked by the Corporation, although only at the expense of other routes, owing to the lack of new rolling stock. The income for the year amounted to £119,339, against £96,224, and the expenditure to £66,456, against £55,085. Of the gross profit, loan charges absorbed £20,576, £3,307 was carried to the reserve fund, £12,000 to the permanent way renewals fund, and £15,000 to the relief of rates. A total of £107,497 has been contributed to the borough fund since the inauguration of the undertaking, and the reserve fund now stands at £24,575. Passengers carried numbered 22,251,657, against 17,810,538, and car-miles run were 1,252,878, against 1,131,728; 2,055,120 units were used, or 1·64 per car-mile, the power costs per car-mile being 2·84d. The average revenue per car-mile was 22·86d., and the average expenditure 13·11d. Passengers carried per car-mile averaged 17·76, and the average fare was 1·21d. The 41 cars in use ran an average of 83·7 miles per day.

Chesterfield.—Fare Revision.—The Corporation has applied to the B. of T. for permission to increase the tramway fares by 50 per cent. in excess of the fares now authorised.

Dover.—Track Renewals.—The Tramways Committee has decided to expend about £10,000 on the improvement of the tramways; the line to River is to be taken up and re-used, and motor-'buses are to be used on this route.

Huddersfield.—Power for Tramways.—The Tramways Committee has placed under the control of the Electricity Committee the generation of electricity for tramways, as well as for lighting and power purposes. The power station at Longroyd Bridge would, therefore, be under the supervision of the Electricity Committee as from the 1st inst.

London.—The whole of the tramway service in Old Kent Road was blocked on Thursday morning, last week, by the breakdown of a steam wagon.

Wages.—At a meeting of the N.U.R., the Associated Society of Locomotive Engineers, and the B. of T., last week, it was decided that the war bonus of the railwaymen should be increased by a further 3s. per week from November 1st last, in accordance with the arrangement by which the wages are to be fixed on a sliding scale according to the cost of living. The bonus now amounts to 33s. per week, and is to stand until January, when the subject will again be considered.

Hammersmith.—The B.C. has communicated with the L.U.T. Co., urging that the tramway track within the borough, which the Council states is in a dangerous condition, be repaired immediately.

District Railway's Jubilee.—We are reminded by the *Daily Telegraph* that this year is the jubilee of the District Railway. Opened on October 1st, 1868, from High Street, Kensington, to Gloucester Road, the line on December 24th, 1868, was extended from Gloucester Road to Westminster. The first experiments in the electrification of the system were made in May, 1900, with an electric train which ran between Earl's Court and High Street. On November 5th, 1905, all steam trains on the District Railway were withdrawn, and electric working became universal.

Overcrowding.—In reply to a question in the House of Commons, on Monday, the Parliamentary Secretary to the B. of T. stated that the desirability of improving the transit facilities, in view of the present overcrowding, was being brought to the notice of the tramway, railway, and omnibus authorities.

Slaithwaite.—Tramways and Street Lighting.—At the U.D.C. meeting, last week, a letter was received from the Huddersfield Branch of the Amalgamated Society of Tramway and Vehicle Workers, asking for all street lamps to be lighted on the main tramway routes in the Council's area, and intimating that if this request was not granted the drivers would refuse to take the cars beyond the Huddersfield boundary. The Council felt that this was an impertinent threat, and, after a discussion on lighting as a whole, decided to light alternate lamps.

Swansea.—Suspended Service.—The tramway service was suspended for three days last week, and the workers now refuse to resume work unless paid for the three days in question.

TELEGRAPH AND TELEPHONE NOTES.

New Cable to Ireland.—The *Evening News* learns that the Western Union Telegraph Co. hopes soon to have working a cable between the English and Irish coasts, which will obviate the difficulty of keeping up communication with landlines.

In regard to the statement that the American cables have "failed recently to meet even urgent demands," it is pointed out that it has been difficult to repair existing cables during the war.

Spain.—A system of wireless telephony has lately been put in operation between Barcelona and the Island of Minorca, with, it is stated, satisfactory results.

United States.—It is reported that the U.S. Government has selected the site of what is to be the largest naval radio station in the world. It is situated four miles from Monroe, in North Carolina, and will comprise 640 acres. A Bill empowering the Government to purchase the site is shortly to be submitted to Congress, and steps are already being taken to begin the construction of the plant.—*Evening News.*

A telegram from Secretary of the Navy Daniels, to the Boy Scouts of America, characterising them as chivalrous young crusaders, disclosed that the Scouts, working on behalf of the Government, discovered 100 illegal wireless plants, 26 of which were found in one day.

The American cable and postal censorship has been abolished.

Plans have been under discussion between the U.S. Government and other nations with reference to the control of cable communications, and it is now reported that the U.S. Government has taken over the operation of all ocean cables owned in the United States.

The Postmaster-General announces the consolidation of the services of the Western Union and the Postal Telegraph Co. under Government control. The new arrangement will come into force on December 1st.

CONTRACTS OPEN AND CLOSED.

OPEN.

Bradford.—November 23rd. Tramways Committee. Stores for 12 months, including lamp fittings, insulating material, &c. General Manager.

Dublin.—November 27th. Electricity Supply Committee. 3,000 to 5,000-kw. steam turbo-generating plant. City Electrical Engineer, Fleet Street.

Enniskillen.—December 1st. Sligo, Leitrim & Northern Counties Railway Co. 12 months' supply of telegraph material. Mr. J. Duff, Secretary.

Manchester.—November 29th. Three-phase, 6,600-volt sub-station switchgear. Mr. F. E. Hughes, Secretary, Electricity Department, Town Hall.

Walsall.—December 5th. Electricity Supply Department. One 500-kw. rotary converter equipment. See "Official Notices" November 8th.

CLOSED.

Hammersmith.—Electricity Committee. Boiler plant extensions:—

Foster Construction Co., Ltd.	£955
D. Rowell & Co., Ltd.	247
H. Young & Co., Ltd.	221
Aston Construction Co., Ltd. (recommended)	**200**
Redpath, Brown & Co., Ltd.	180
Measures Bros., Ltd.	178

Mechanical stoker:—

E. Bennis & Co. (travelling step chain grate)	£1,980
Stirling Boiler Co., Ltd. (chain grate)	1,600
Underfeed Stoker Co., Ltd. (travelling grate)	1,455
Erith's Engineering Co., Ltd. (Erith-Riley) (recommended)	**1,350**

Owing to the Coal Controller having diverted several consignments of coal from the electricity undertaking, due to the continued curtailment of coal supplies, the engineer has made inquiries as to obtaining other fuel, and after inspection of the plant of the South Primrose Coal Co., is of opinion that "anthracite culm" can be used as fuel in the furnaces of the electricity works; as a trial, 250 tons of this coal has been ordered at 18s. per ton, plus 11s. per ton for carriage.

Sunderland.—T.C.:—

Switchgear.—Ferguson, Pailin & Co., Ltd.
Motor for coal conveyor.—British Thomson-Houston Co., Ltd.

FORTHCOMING EVENTS.

Junior Institution of Engineers.—Friday, November 22nd. At 39, Victoria Street. At 7 p.m. Lecturette, "Novelties in Pumping Machinery," by Mr. H. P. Anderson.

Wednesday, November 27th. At 2.30 p.m. Visit to Bryant & May's Match Works, Bow.

Friday, November 29th. At 7.30 p.m. At 39, Victoria Street, S.W. Social evening.

(Midland Section).—Friday, November 22nd. At 7.45 p.m. At the Imperial Hotel, Birmingham. Paper on "The Planimeter Simply Explained without Mathematics," by Mr. W. J. Tennant.

(North-Eastern Section).—Tuesday, November 26th. At 7.15 p.m. At the Mining Institute, Newcastle-on-Tyne. Paper on "Boilers, Coal and Gas Fired," by Messrs. E. F. Oakford and S. H. Moore.

(Sheffield Section).—Friday, November 29th. At the Cutler's Hall. At 7.30 p.m. Presidential address by Dr. P. Longmuir.

Institution of Electrical Engineers (Students' Section).—Friday, November 22nd. At 7 p.m. At King's College, Strand, W.C. Address on "The Permeability of Faintly-Magnetic Materials," by Prof. E. Wilson.

(North-Eastern Centre).—Monday, November 25th. At the Mining Institute, Newcastle-on-Tyne. At 6.45 p.m. Address by the President, Mr. C. H. Wordingham, C.B.E.

(North Midland Centre).—Tuesday, November 26th. At the Metropole, King Street, Leeds. At 7 p.m. Address by the President, Mr. C. H. Wordingham, C.B.E.

(North-Western Centre).—Tuesday, November 26th. At the Engineers' Club, Manchester. At 7 p.m. Paper on "The Use of High-Pressure and High-Temperature Steam in Large Power Stations," by Mr. J. H. Shaw.

(South Midland Centre).—Wednesday, November 27th. At the University, Birmingham. At 7 p.m. Paper on "The Use of High-Pressure and High-Temperature Steam in Large Power Stations," by Mr. J. H. Shaw.

Physical Society of London.—Friday, November 22nd. At 5 p.m. At the Imperial College of Science, South Kensington, S.W. Ordinary meeting.

Manchester Association of Engineers.—Saturday, November 23rd. At 6.30 p.m. At the Grand Hotel. Paper on "Conveyors in Relation to Engineering Works," by Mr. W. H. Atherton.

Birmingham and District Electric Club.—Saturday, November 23rd. At the Swan Hotel. At 6.30 p.m. Concert (ladies' night.)

Electrical Power Engineers' Association.—Saturday, November 23rd. At 6.30 p.m. At the Foresters' Hall, Cardiff. General meeting for the purpose of forming a South Wales Section.

Industrial Reconstruction Council.—Wednesday, November 27th. At the Saddlers' Hall, Cheapside, E.C. At 4.30 p.m. Lecture on "Labour and Industrial Development," by Mr. E. J. P. Benn, C.B.E.

Greenock Association of Electrical Engineers.—Saturday, November 30th. Visit to Coats's Observatory, Paisley.

NOTES.

Employment of Officers.—The official mechanism for placing officers and ex-officers in employment on demobilisation is the Appointments Department of the Ministry of Labour. This department, which is under the direction of Mr. T. C. Horne McCall, has been in existence since March last, but it is now extending its authority to deal with the re-employment of all officers, disabled or otherwise. The department has an efficient system by which officers can be found positions if they are qualified, or can be trained for positions if their education has been neglected or interrupted. At the present time 2,000 officers are being trained by the department for special posts in civil life.—*Financial Times.*

The Premier on Reconstruction.—At the meeting with which the Prime Minister, Mr. Bonar Law, and Mr. Barnes opened the Coalition campaign, which was held on Saturday at the Central Hall, Westminster, Mr. Lloyd George indicated a general line of policy upon which the three sections of the Coalition were agreed. Better housing, better wages, better working conditions, all of them as a means of remedying the appalling condition of the national health revealed by the recruiting statistics; State regulation of the means of transport, protection of key industries, the development of agriculture, the development of industrial production, were some of the lines of progress that he indicated.

This country, he said, had for generations set an example to the world; let it continue to set that example. We could not return to the old conditions; we could not go back. If the new Parliament rose to the level of its great opportunities the Empire would be firmly established on the only solid basis—that of a happy, prosperous, and contented people.

The task of reconstruction should begin immediately; delay there was dangerous. The condemnation of the old wasteful system was to be found in the recruiting statistics, which revealed a higher percentage of physical unfitness in this country than in any other. That was a disgrace. It was not through poverty—we were the richest country in the world—but through mismanagement, which allowed the people to be underfed, ill-housed, and overworked. The health of the people must especially be the concern of the State. The housing question must be a national task. Wages which had been forced up by the war must not be permitted to drop to the point where the strength of the worker could not be maintained in efficiency.

That was one of the war revelations. The other was that, industrially, we were an ill-organised State. Every industry had been told rudely by the State to mind its own business, and, under the circumstances, some did well and others did badly. Unfortunately, among those which did badly were the industries which were discovered during the war to be essential to the national safety. We found many industries crippled by deliberately unfair competition, and the only answer they had was "That was their look-out." That would not do. Agriculture was almost completely neglected by the State. The problem of transportation had been left very largely to chance. Railways, canals, roads, tramways, all were vital to the life, the industry, the amenities of the people. This problem must be taken in hand under the direct inspiration and control of the State. Electric power, so necessary to industry and comfort, must be taken in hand. All these problems required a thorough, sympathetic, and courageous working out. We must face them like patriots and not partisans.

The problem for the nation in the coming election was to choose its builders for the great reconstruction. He wished it had been possible to get every party, every section of the community united for that task. He wanted the traditions that made Mr. Disraeli in his best days plead in that great book of his for a minimum wage, for better houses, for shorter hours, and for making the life of the people a national concern. The conduct of the war by the Government in these days was a great piece of national organisation. It affected every trade, every business; all the life of the nation had had to be reconstructed and reorganised for war, and he claimed that if a Government could do that for war it could do it for peace.

Mr. Bonar Law supported the Prime Minister. He said a clear issue had been raised, the nation had got to decide whether the problems in front of us were to be faced not from a party point of view, but from a national point of view. We were going to be faced with problems the nature of which we could not foresee. The whole life of this country, its social and its economic life, had to be changed, and one could not foresee to-day the exact nature of the problems which would arise or the way in which we should have to deal with them. These problems would come very quickly, and would have to be settled quickly. If the condition of wages and of well-being of which the Premier had spoken were to be maintained, production would have to be maintained and increased.

Mr. Barnes said that his appearance that day marked for him a definite break from a political party. There were times when one had to choose one's course apart from personal considerations; his highest ambition was to serve Labour, and he thought he would be serving Labour best by staying in the present Government until normal life had been resumed in peace and security. When he said peace, he included industrial peace and social peace. He believed in co-operation as against competition, and he looked with some alarm upon the eagerness in certain quarters to get rid of governmental control. He was in favour of the nationalisation of monopolies and the control of essential services until such time as the release from control was consistent with public welfare. We had to get through immediate, practical, pressing problems. Those problems were upon us now. Two things were necessary in industry after the war. The first was the highest possible standard of living, and the second was the highest possible production of goods; the one depended upon the other. It was because he believed that the Coalition Government was sincerely desirous of applying those principles of co-operation and goodwill that, whether in it or out of it, he would do his humble part to help it.

Out-of-Work Donations.—On Tuesday the Ministry of Labour issued the details of its scheme of out-of-work donations, which will come into force on Monday. Out-of-work donation policies will not be issued before that date.

Ex-sailors, soldiers, and airmen will be entitled to out-of-work donation policies, available for 12 months, if they have actually served with the Forces during the present war, and civilian workers will be entitled to out-of-work donation policies, available for six months, if they are British subjects and became "employed contributors" under the National Health Insurance scheme before August 25th, 1918, and in the case of boys and girls between 15 and 16 if they entered employment before that date. Unemployed persons desiring to claim donation should, on and after Monday, attend at an Employment Exchange or Branch Employment Office, taking with them their discharge or other military certificates if they served in his Majesty's Forces during the present war, or their Health Insurance record cards and Health Insurance contribution cards if civilian workers. In the ordinary cases attendance daily or as otherwise directed, between specified hours at the Employment Exchange or Branch Employment Office will be required as a condition of receipt of donation. The rates of payment are:—

	Per week. £ s. d.
Men over 18	1 4 0
Women over 18	1 0 0
Boys between 15 and 18	0 12 0
Girls between 15 and 18	0 10 0

In the cases of men and women there will be supplementary allowances for dependent children of 6s. a week for the first child under 15 years of age, and 3s. a week for each additional child under that age, and payment in the case of boys and girls is subject to attendance, if required, at a course of instruction under the Board of Education or other central authority. Donation does not become due until after the applicant has been unemployed and has attended at the Exchange for three consecutive working days, and payment will not be made for these three days.

Institution and Lecture Notes.—Institution of Electrical Engineers (Western Centre).—The second meeting of the session was held at the South Wales Mining Engineers' Institute, Cardiff, on November 11th. Despite the peace or armistice celebrations, the chairman (Mr. H. I. Rogers) had the pleasure of presiding over one of the largest attendances at a meeting held by this Centre. The visit of the President (Mr. C. H. Wordingham), no doubt, accounted for the numerous attendance. The Secretary of the Institution (Mr. P. F. Rowell) was also present.

The President congratulated the Western Centre on its recent acquisition of new territory, and based a lengthy address on the work of the Institution. The work accomplished during the past session was reviewed, and his proposals for the remodelling of the Institution, having regard to the obtaining of a Royal Charter, were listened to with keen interest. He also made a special plea for the Benevolent Fund, and suggested that members, when forwarding their subscriptions for the coming year, should increase them by the sum of one shilling, this sum to be ear-marked for the Benevolent Fund. If this were done, the Fund would benefit by a very substantial amount.

A short discussion ensued on the President's scheme, and a hearty vote of thanks was accorded Mr. Wordingham for his address.

On Tuesday, last week, Mr. A. P. M. Fleming, chairman of the NORTH-WESTERN CENTRE, delivered his inaugural address, on "The Human Factor in Industry."

Miners' Strike for Electric Lamps.—The demand of the miners employed at the Hucknall Colliery for a supply of electric lamps not having been complied with, about 2,000 miners, enginemen, and firemen struck work on the 12th inst. The grievance is one of two years' standing, and the company's agent states that the company is quite willing to furnish the lamps, but is unable to obtain a supply. The men refused the Coal Controller's suggestion that the matter be referred to the Trades Disputes Board.

Wages (Temporary Regulation) Bill.—This Bill was before the House of Commons in Committee, on Tuesday, and was read a third time. It relates in one of its clauses to the obligation to pay prescribed rates of wages for six months, and it was stated by the Minister of Labour that the general assent of both employers and employed had been secured. The prescribed rate can be altered by an award of an interim Court of Arbitration which is to be established, or by steps taken by the Minister of Labour. Proceedings for offences may be brought before Munitions Tribunals.

Foreign Trade.—THE OCTOBER FIGURES.—The official returns of imports and exports during last month contain the following electrical and machinery figures :—

IMPORTS.	*October*, 1918. £	*Inc. or dec.* £	10 *months*, 1918. *Inc. or dec.* £
Electrical goods ...	117,288	+ 6,016	− 212,910
Machinery	674,993	−239,763	+ 1,737,809
EXPORTS.			
Electrical goods, &c. ...	171,201	− 45,486	− 791,895
Machinery	1,391,597	− 42,997	− 3,057,555

Volunteer Notes.—ROYAL ENGINEERS (VOLS.), LONDON ARMY TROOPS COMPANIES.—Headquarters: Balderton Street, Oxford Street, W. 1.

Regimental Orders No. 48, by Lieut.-Colonel C. B. Clay, V.D., Commanding. Monday, November 25th, to Saturday, November 30th.—Drills as usual.

C. HIGGINS, *Capt.* R.E., *Adjutant.*

Decimal Coinage.—At the meeting of the Court of Common Council of the City of London, last week, the following resolution was unanimously adopted :—"That in the opinion of this Court it is important, in the interests of the trade of the country, that our system of coinage be placed on a decimal basis at the earliest possible moment, and in this connection the Court supports the principle of the Decimal Coinage Bill recently introduced into the House of Lords by Lord Southwark, and now under the consideration of a Royal Commission."

Appointments Vacant.—Assistant electrical superintendent, also A.C. meter tester and repairer (70s.), for the Greenock Corporation Electricity Department; installation inspector, for the Stepney B.C. Electricity Department; technical officer (£1,000), for the Electrical Research Committee; charge engineer, for the Wallasey Corporation Electricity Department; shift engineer (£250 + £35), for the Manchester Corporation Electricity Department; draughtsman for the Battersea B.C. Electricity Department; shift engineer (65s. + 12½ per cent.) for the Leigh (Lancs.) Corporation Electricity Works; fuel and ash superintendent (£281) for the Wolverhampton Borough Electricity Department; electrical instrument maker as instructor to discharged soldiers for the Wimbledon Technical Institute. See our advertisement pages to-day.

Scientific Research.—A Scientific Research Association in the interest of engineering and shipbuilding is to be established by the North-East Coast Institution of Engineering and Shipbuilding. We would draw the special attention of our readers to the important announcement under "Appointments Vacant" (above), regarding the appointment of a technical officer by the Electrical Research Committee of the I.E.E. and the B.E.A.M.A.

Patents and Alien Enemies.—The application to avoid or suspend Patent No. 23,319/07, granted to Hartmann & Braun Akt.-Ges., has been withdrawn by Messrs. Johnson & Phillips, Ltd.

Electric Steel Furnaces.—In the course of his paper, read on the 9th inst., before the Staffordshire Iron and Steel Institute, and briefly referred to in our last issue, Mr. F. J. Moffett stated that at the end of 1917 the electric furnaces installed in the United Kingdom were as follows :—

Héroult	46	varying from	1½ — 10 tons
Greaves-Etchells ...	31	,, ,,	½ — 12½ ,,
Electro-metals ...	27	,, ,,	1½ — 10 ,,
Rennerfelt	8	,, ,,	¾ — 2½ ,,
Stobie	6	,, ,,	5 — 15½ ,,
Other makes ...	22		

Of these 140 furnaces nearly one-half were in the Sheffield and Rotherham district.

It was evident that the arc type of furnace had established its superiority from a commercial point of view. The induction furnace was now very rarely adopted in this country for steel refining.

The standard sizes of furnaces with the transformer capacity and the approximate units per ton of finished steel were thus stated by the author :—

Size.	Transformer capacity.	Units per ton.
25 cwt.	300 KW.	850
2½ tons.	500 ,,	800
5 ,,	800 ,,	750

The decrease in the units per ton does not go on indefinitely; when the capacity of 15 tons is reached, the units per ton appear to reach their minimum value. Sir Robert Hadfield, in a recent account of the fuel and electric power consumption at his works at Sheffield, stated that in 1917 the units per ton used for 31,850 tons of electric steel were 782.

We may add that there are at the present time one or more 25-ton furnaces under construction. The total output of electric steel in this country in 1917 was 110,000 tons.

Every Man to his Métier.—He was explaining how he came to be in the camp kitchen. "I'm a mainsman," he said, "and when I did a trade test I was told to solder a joint. I did it all right, and my papers were marked 'joint well done.' And, blimey, the next thing I knew I was ordered to France *as a first-class cook.*

OUR PERSONAL COLUMN.

The Editors invite electrical engineers, whether connected with the technical or the commercial side of the profession and industry, also electric tramway and railway officials, to keep readers of the* ELECTRICAL REVIEW *posted as to their movements.

Central Station and Tramway Officials.—According to a local report, a proposal to advance the salary of Mr. A. S. BLACKMAN, borough electrical engineer at Sunderland, from £1,000 to £1,200, was opposed, and disapproved by the Council, on the ground that the salary was ample for the position, and that it would not be fair to the ratepayers to make such an increase when the undertaking was not a paying concern.

Mr. A. A. BLACKBURN, chief engineer and assistant to the general manager of the Belfast City Tramways, has been appointed manager and engineer of the Huddersfield Corporation Tramways. There were 29 applicants.

Mr. W. CLOUGH, manager of the Bury Corporation Tramways since its formation, has tendered his resignation. It was decided to place on record an appreciation of his services in connection with the department. Mr. Clough has resigned in order to take up an important appointment with a large firm of paper makers which has mills in the Bury and other districts. The Tramways Committee is to advertise for a successor at £500 per annum.

Stockton-on-Tees T.C. has declined an application by the electrical engineer, Mr. J. J. SMITH, for an increase of salary, but has granted a war bonus of £50 for the year ending March 31st, 1919.

General.—Coun. DAWSON is resigning the chairmanship of the Woolwich B.C. Electricity Committee.

On November 2nd, at Manchester, Captain A. E. McCONNELL, R.E., was married to Christina Isobel, youngest daughter of Mr. Peter Waters, of Old Trafford, Manchester. Captain McConnell is on the export staff of the British Westinghouse Co. He went out with the 2nd Manchesters to Gallipoli, was wounded, invalided home, and given a commission in the R.I.R.'s, is now transferred to the R.E.'s, and is at one of the locomotive depôts in France.

Darwen T.C. has elected Aldermen Carus, Cocker, Eccles, Pickup and Tomlinson, and Councillors Davies, Duxbury, Gibson, Hindle, Ainsworth, Broadbent, Holden, Holgate, Jepson, Pickup and Thornley to serve on the Electricity Committee of the Corporation for the ensuing year.

Mr. BURMAN has been appointed chairman of the Birmingham Electric Supply Committee. Mr. LEE is the new chairman of the Birmingham Tramways Committee.

Ald. S. G. KIMBER, the retiring Sheriff of Southampton, and for six years Chairman of the Electricity Committee, has been elected Mayor.

Ald. G. H. ROBINSON and Mr. J. HALEY have been reappointed chairman and deputy-chairman of the Bradford

Electricity Committee, and Ald. Enoch Priestley and Mr. I. F. Akeroyd as chairman and deputy-chairman of the Tramways Committee.

The Hammersmith B.C. Electricity Committee has appointed Coun. Stamper chairman and Coun. Jones vice-chairman.

The Shoreditch B.C. Lighting Committee has re-elected Coun. Major W. Weber chairman and Coun. T. H. Bird vice-chairman.

Mr. W. H. Hérod, who has been for 10 years with the London office of the Oerlikon Co., has joined the staff of the engineering department of the General Electric Co., Ltd., 67, Queen Victoria Street, E.C. 4.

Mr. E. C. Kelly, recently publicity manager for Simplex Conduits, Ltd., is resigning the post to take up the representation of *The Engineer* for the Midland district.

Roll of Honour.—In our issue of November 11th we stated that the Military Cross with two bars, won by his son, Flight-Commander Monteagle-Barton, R.A.F., who was killed last February, had been received by Mr. Leonard *Barton*, M.I.E.E., of Wallington. The name was incorrectly printed. It should read *Barlow*, not Barton. Mr. Leonard Barlow is Technical Adviser to the Priority Department.

Private H. Hyman, Manchester Regiment, who has died of wounds, was with the British Westinghouse Co., Ltd., Trafford Park.

Major F. A. Robinson, M.C. (with bar), 10th Tank Battalion, who was formerly in the electric light department of the India-Rubber Co., Silvertown, was killed on November 4th whilst leading an attack at Catillon, near Le Cateau, France. He was the son of Commander F. W. Robinson, of the submarine department of the India-Rubber Co.

Private H. Treacher, Manchester Regt., who has died of wounds, was formerly employed by Messrs. Ward & Goldstone, Salford.

Private J. W. Rady, signaller, who died of pneumonia in Italy, was an employé of Messrs. Connolly Bros., Manchester.

Private G. A. Dickinson, East Lancashire Regiment, has been killed in action, aged 21 years. He was employed by Messrs. Dick, Kerr & Co., of Preston.

Private E. Ferriday, R.N.D., a Military Medallist, who has been killed in action, aged 22, was employed by Messrs. Ferranti, Ltd.

Lance-Corporal H. Bill, R.A.M.C., awarded the Military Medal for conspicuous bravery in the field, was employed by Siemens Bros. Dynamo Works, Stafford.

Cadet G. W. Auden, R.A.F., who has died from septic pneumonia, enlisted whilst training as an electrical engineer at the Derby Technical College.

Sergeant P. Woollett, Sherwood Foresters, who has fallen in action, was on the staff of the Kent Electric Power Co., Ltd., of Chatham.

Private R. Smith, Border Regiment, who has been killed by shell fire, was engaged in the Carlisle Corporation electricity department.

Signaller W. Redshaw, who has fallen in action, was with the Scarborough Electric Supply Co.

Corporal J. J. Hills, R.E., who was an electrician with Mr. W. D. Dickinson, of Bexley Heath, has been awarded the Military Medal for keeping lines of communication intact under heavy fire.

Rifleman A. Ruston, West Yorks. Regiment, who has been killed in action, was formerly in the employ of Messrs. S. Dixon & Son, Leeds.

Obituary.—Mr. E. Russell-Clarke.—We regret to learn of the death of Mr. Edward Russell-Clarke, C.B.E., Technical Adviser to the Intelligence Department of the Admiralty, at the age of 47. The *Times* says that in 1895 he was called to the Bar, and he soon acquired a successful practice in patent and other cases in which there was scope for his remarkable scientific talent. But he was never really content to be simply understanding and expounding scientific apparatus; he wanted to be inventing and improving; and while he was at the Bar he took out many patents, particularly for inventions connected with electricity. But it was in the last four years that he truly found his opportunity, and that the real work of his life was done. At the outbreak of war he gave up his practice at the Bar, and placed himself at the disposal of the Admiralty, and was attached to the Intelligence Department as Technical Adviser. His death was the result of a complete breakdown due to incessant work, from which he had allowed himself no respite since the beginning of the war. He was a close friend of the late Col. Hopkinson.

Mr. H. Hargreaves.—The death occurred recently of Mr. Harry Hargreaves, who was formerly employed on analytical chemistry at Accrington electricity works.

Mr. Llewelyn Preece.—At the funeral service of the late Mr. Llewelyn Preece, held on November 14th, at Christ Church, Victoria Street, the Institution of Electrical Engineers was represented by the following:—Mr. C. H. Wordingham, C.B.E., President; Mr. W. M. Mordey, Mr. Alexander Siemens, Sir John Snell, Mr. J. Swinburne, Past-Presidents; Mr. J. E. Kingsbury, Hon. Treasurer; Mr. L. B. Atkinson, Mr. J. S. Highfield, Mr. A. P. Trotter, Members of Council; Mr. P. F. Rowell, Secretary.

Dr. I. Fujioka.—We learn that Dr. I. Fujioka, M.E., president of the Tokyo Electric Co., and a director of several firms, passed away on March 5th, 1918, of apoplexy. He was a member of the Institution of Electrical Engineers and other societies.

CITY NOTES.

Dick, Kerr and Co., Ltd.

Mr. Claud T. Cayley, presiding at the annual meeting on November 14th, said that the profit for the year under review was not much short of that for the previous year, and in view of the fact that the directors' policy had been gradually to prepare, where possible, for the reconstruction of the business on post-war conditions, no doubt they would consider the year's results satisfactory. The total on the asset side of the balance-sheet was this year over two and a quarter million pounds, which was a record figure so far as the company was concerned. The individual items which made up that total were in the main not widely different to those of last year with the exception of the assets "contracts, due to work, stock of materials, &c.," which was roughly £100,000 more than it was in 1917. That item covered the sums due to the company in respect of their various contracts, together with the stock of material carried in respect of them and so forth, and was naturally bound to fluctuate from year to year. Capital expenditure was some £20,000 less than last year, and he did not doubt that they would fully endorse the conservative policy of which this writing down was evidence. Investments stood at £338,000 odd, as against £341,000 odd in 1917. That decrease, however, was the net result of two large transactions. Last year he reported on the acquisition of the bulk of the "B" preference stock of Willans & Robinson, Ltd., partly by cash and partly by exchange of shares, which they issued for the purpose. This transaction occurred after the close of their financial year, and was, therefore, not reflected in the 1917 accounts. On the other hand, since the last meeting the whole of their holding of United Electric Car Co., Ltd., preference shares had been disposed of, so that the latter transaction largely offset the former. The works had continued to be fully employed, and he was glad to say that during the past few months the demand for certain purely war products having become less urgent, opportunity had been taken to establish a process of gradually changing over, and in that connection it was pleasing to note that the Ministries of Munitions and Reconstruction, remembering perhaps the way in which they threw themselves whole-heartedly into the production of war material in the early days, had given considerable assistance. While, therefore, there must inevitably be a hiatus of disorganisation, they hoped to be able to retain the continuous services of a considerable portion of their workpeople, first of all in the operations necessary to rearrange the factories, and later in standard production, provided raw material was available. The raw material required for the class of machinery in which they specialised was very different from raw material as understood generally by the public. Material such as steel forgings and castings, copper wire, and many other things which were the basis of their manufacture, were the finished article with many other producers, upon which months of work must already have been expended before they arrived at their stores. During the year the work of consolidating into their own organisation those of Willans & Robinson and the United Electric Car Co. had been completed, and the management committee had been strengthened and made still more representative by the appointment of Mr. Davenport and Mr. Bennett from Rugby, and Mr. Conner, an old and trusted member of their staff. An alliance had also been made with Siemens Bros. & Co., Ltd., by which it was thought much economy could be attained through the amalgamation of selling organisations and co-ordination of designs and products so as to avoid overlapping. Siemens and themselves were not competitors in manufacture. They were long established as makers of all kinds of cables, from submarine telegraph to power transmission, dynamo machinery, telephones, instruments, and so on, while they had specialised in apparatus for railways and tramways, steam turbines, and the larger classes of electrical machinery. The two manufacturing organisations dovetailed into each other perfectly, and only small adjustment was required to bring the commercial sides together with material benefit to both. This arrangement was referred to by Mr. Mure Ritchie, the chairman of Siemens Bros., Ltd., in his speech to the shareholders of that company in June last, and it had now been consummated by an exchange of directors, Mr. Mure Ritchie having taken a seat on their board, and he (the speaker) having joined that of Messrs. Siemens. An interesting development which had taken place since the last meeting was the establishment in France and in Japan of companies to exploit their manufacturing rights in connection with apparatus for railways and tramways. It must be gratifying to them to know that Dick-Kerr machinery ranked so highly in these important countries that representative technical and business men were willing to provide the considerable capital required for such undertakings. These companies would also act as their agents in their respective countries, thereby contributing important outlets for the products of their own factories, should there be a surplus available. It was obviously inadvisable to make public the details of their arrangements with those companies, but the terms were considered by the board to be satisfactory. He referred last year to the conviction on the part of those studying the position on their behalf that the after-war demand for their products would be very great. The correctness of that opinion was proved by the demand which already existed for all classes of electrical machinery,

and especially large-sized steam turbine generating plant, upon which they had specialised for some years. It had further been brought home to the management that the manufacturing capacity of the country for heavy electrical machinery was much below the demand, and that in their own case they must, if they wished to retain the position they held at present, find facilities not only for increased output, but also for the production of individual units larger than their present shops admitted of. Having reached that conclusion, they were faced with the difficulty, if not impossibility, at all events for a long time to come, of extending the works, obtaining the necessary machinery, and building up a strong organisation. It was therefore with pleasure he had to inform them that they had solved the difficulty in a very satisfactory manner. An option agreement had been entered into with the Coventry Ordnance Works, Ltd., who owned an engineering works of modern design and equipment which, although not at present occupied upon electrical work, could very quickly be converted to that purpose. In due course the shareholders would receive full particulars of the proposal, and they would be asked to consent to an exchange of their shares for those of a new company, which, in the event of the offer being accepted, would control both concerns. The Coventry Ordnance Works, Ltd., which was not a public company, had an issued capital of £800,000, and debentures of £600,000. Its proprietors were Messrs. John Brown & Co., Ltd., Messrs. Cammell, Laird & Co., Ltd., and Messrs. Fairfield Shipbuilding & Engineering Co., Ltd. The shops were laid down for the purpose of making heavy armament, were modern both in respect of design and equipment, and could be easily altered for the production of heavy electrical machinery. In addition to the armament business done by the company, they had also a considerable output of non-war material, which it was expected could be materially increased. Full particulars would be sent to the shareholders in due course.

Mr. R. H. Prestwich seconded the motion, which was adopted unanimously.

British Westinghouse Electric and Manufacturing Co., Ltd.

A meeting of preference shareholders of this company was held on Tuesday at Hamilton House, Victoria Embankment, to consider a resolution for modifying their rights to the effect that in future such shares should be entitled *pari passu* with the existing ordinary shares to a non-cumulative preferential dividend at the rate of 8 per cent. per annum. Mr. J. Annan Bryce, M.P., the chairman, presided, and there was a large attendance.

The Chairman, in formally proposing the resolution, explained that the real object of the meeting was to consider a plan for the increase of capital by the sum of five millions. At previous general meetings, and particularly at the last one, the reasons for an increase of capital were emphasised. It was pointed out that large sums would have to be spent on research and experimental work. Their trade was one which, almost more than any other, was undergoing constant and rapid changes, involving very large and difficult problems of development. To meet the constantly changing and increasing demand they were under the continual necessity of altering and adding to their buildings and plant at Manchester. In connection with their associated companies abroad, there were similar needs, which demanded large contributions, and there were, moreover, before them propositions in themselves promising for the extension of their activities into other countries. If they were not prepared to meet these various demands, they might be unable to maintain their present position. The urgency of the necessity for more capital was emphasised by the happily near approach of peace. Germany would strain every nerve to meet by increased production the tremendous claim for reparation and indemnity which every consideration of justice demanded should be imposed on her. In one important respect she had a great advantage over ourselves. Her enterprise had not been saddled during the war with the colossal burdens in the form of income tax and excess profits tax which British enterprise had had to bear. The balance sheet of one of their German competitors, the Allgemeine Electricitäts Gesellschaft, showed that at the end of 1915 they had cash resources of 7 million pounds accumulated for dealing with work after the war, and those resources might have been greatly increased during the three subsequent years. The Allgemeine and its associated companies had together a capital of 50 millions sterling. The organising genius of the Germans would secure that those resources should become available by State credit or otherwise for the vital needs of the country as a whole. Even a Socialist Government would see to that. Do not let them imagine that the Germans would not have a market. Even if the loathing which their bestial methods had inspired prevented their direct access to the markets of the belligerent countries, it would require great ingenuity to prevent their indirect access even to belligerent countries. The neutral markets were open to them, countries in which the capitalist classes had, owing to the war, increased enormously in riches, which they were eager to employ in every kind of industry for which those countries might offer a field. Moreover, the neutral countries themselves wished to take a hand in the electrical industry, for which some of them, notably Sweden, Norway, and Spain were admirably adapted by their command of water power. Then there was America. The years of the war before she entered it gave her gigantic profits in which her subsequent expenditure, lavish though it had been, had not yet made any considerable hole. From being a debtor she was now a creditor country. Her technical knowledge was of the best, the keenness and energy of her manufacturers immense, and the productive power of her workmen unsurpassed. There they had what they were up against:—Germany fully equipped and desperate, the neutrals rich and eager, America able, rich, and determined. Here, too, they had able and powerful competitors, some of whom, such as Dick, Kerr & Co., and the General Electric Co., had lately effected amalgamations and secured large increases of capital. They would admit that he need say no more about the necessity imposed upon them to follow their example. Roughly, there were three ways in which additional capital might be arranged in their case, and all of them had been carefully considered. First, it might be put in ahead of the preference shares in the form of debentures. Secondly, it might be made to run *pari passu* with the existing preference shares, and thirdly, it might be put in behind them. The last was the course which the board had thought most convenient. What the meeting was principally concerned with was the effect on the preference shares. It was proposed that instead of being entitled to 15 per cent. and a quarter of the surplus after the ordinary shares had received 30 per cent., and the deferred shares 7½ per cent., they should receive only 8 per cent. It was further proposed that in a liquidation the shares should rank only for £2 instead of as at present for £5, and both in this respect and as regarded dividend, *pari passu* with the existing ordinary shares. The preference shares were therefore to give up two substantial advantages, and it might be asked what was the *quid pro quo*. The answer to that was best seen by a consideration of the alternatives. They could not go on as they were. Not only could they not provide for expansion, but it was highly doubtful whether they could continue to pay a 7½ per cent. dividend. Given that fresh capital was required, it was plain that to obtain it sufficient inducement must be held out. It was quite certain that, under present prospects, no one would put in fresh capital behind preference shares entitled to 15 per cent., a further quarter of surplus, and £5 on a liquidation, and on the best information they had been able to get, both now, and at the time the control was transferred from America, the directors did not think that fresh capital could be induced to come in behind the preference shares on better terms than those now proposed. It might be asked, as there was no provision for the 8 per cent. being cumulative, what prospect was there that it would be paid? The answer was that a regular 8 per cent. was practically assured by the putting in of a large amount of money behind the preference shares, money which would increase the earning power of the company, and which would not be put in unless the subscribers saw their way to a fair return upon it. Contemplating, as it did, a large expansion of the business, the board was asking for an increase of 5 millions. Naturally, it did not propose to issue all that sum at once, but it did see its way to use a minimum of one million, and possibly two millions within a year, and it undertook to have issued and subscribed one million as a minimum and two millions if required during that period. It saw its way to procure those sums at such intervals as might be necessary during that period. Under those circumstances, it considered that the preference shareholders might feel sure of getting their 8 per cent. regularly. With regard to the reduction of the right on a liquidation to £2 instead of £5, there was the very substantial *quid pro quo* of the greatly enhanced value of the security produced by the putting in of so large a sum as even one or two millions, a sum which in the future would in all probability be largely increased. Considering the alternatives, capital could be put in ahead of the existing preference shares only in the form of debentures. The existing debenture stock of £1,241,353 was raised early in the company's history when money was cheap, at 4 per cent., but in the present condition of the money market, and with two other series of debentures in front of it, a third series, as that would have to be, could be placed only at a very high rate of interest. It was evident that that method would not only injuriously affect the return on the preference shares, but would, especially if the issue were large, seriously imperil their security. The board accordingly did not entertain that method. The second alternative, that of an issue of shares *pari passu* with the existing preference shares, was seriously considered, but finally was discarded owing to the various difficulties which would have arisen in connection with the other classes of shares. He was satisfied that the scheme now before them was preferable. It was the intention of the directors to give deserving employés, whether members of the staff or workmen, the opportunity of subscribing, a step which they would no doubt approve as tending to identify them with the prosperity of the company. If it were decided to offer the new shares to existing preference shareholders, the directors would probably be induced to give preference in allocation to such as had been of service in the past or might be useful in the future.

Sir Ernest Hiley formally seconded the resolution.

Mr. Herbert Smith said that while agreeing that expansion of the capital appeared to be desirable, he thought the board ought to bear in mind the danger of too rapid or too reckless an expansion. He thought the best way to get fresh capital was by the issue of ordinary shares, but the question was

whether the ordinary share capital which it was proposed to issue could not be placed on terms which would be more favourable to the existing preference shareholders. He thought it a great pity that the board should have started to evolve their scheme without having called into consultation some of the important interests represented at that meeting. At the eleventh hour they had to discuss proposals which might have been made the subject of agreement if they had been called into consultation earlier. Two points called for strong criticism. In the first place, they were asked to give up a very substantial part of their rights with the prospect of large sums of money being brought in behind them. Supposing that money was not brought in, the preference shareholders would have given up their birthright and got nothing for it. He suggested that whatever decisions they arrived at they should be based upon the principle that the variation in their rights should synchronise with, and be contingent upon, some very sensible proportion of the new ordinary capital being placed. In the second place, he found that in the city there was a very strong view that whatever arrangements were made with the preference shareholders they should hold some right of conversion. He strongly appealed to the board to adjourn the meeting in order that the scheme might be looked into by a committee on behalf of the preference shareholders.

Mr. E. Birks, Mr. Varley, and other speakers strongly supported an adjournment.

Sir Ernest Hiley said that the Metropolitan Carriage Co. came into the concern in 1917 as industrialists, and Messrs. Vickers had come in in the same position since. It was patent that an increase of capital was necessary if the company was to carry on and expand, and take the place it ought to in the electrical industry of the country. That capital could only be raised by the issue of debentures or ordinary shares. They could bring in fresh capital, but they were not going to do so if they had got preference shares with 15 per cent. dividend in front of them. He wanted to emphasise that they would want an extra million of money very soon—probably two millions before 12 months were up. The shares would be issued, and after being offered to the workpeople and to those who had helped the company in the past, if they were not taken up the Metropolitan Carriage Co. would see that what were left were taken up at par. As to a conference between the board and certain people who were representing the preference shareholders, such a meeting had been arranged for Thursday, when Mr. Smith, Mr. Robert Fleming, and Mr. Robert Benson were going to meet Mr. Dudley Docker, and he had no doubt that some satisfactory arrangement would be made there. Although the board had sufficient proxies to carry the scheme, they had no desire to rush it, and, personally, he saw no objection to an adjournment, as suggested by Mr. Smith.

Eventually the meeting was adjourned until Monday, on the understanding that in the meantime the suggested conference should take place.

Drake and Gorham, Ltd.

Presiding at the annual meeting on November 13th, Mr. B. M. Drake said that the year's profit of £18,781 compared with £11,395 for the previous year, and constituted a record, their best year previously being £16,327 in 1913. The profit on turnover worked out at under 6 per cent., so that they could not be accused of profiteering, but as excess profits duty was exacted without regard to the rate of profits realised they would probably have to pay a considerable sum which they would have been glad to conserve for meeting the needs of after-war trade. He referred last year to the power station already erected for one of the most important chemical manufacturing companies, and to negotiations then in progress for similar work on a larger scale. He was pleased to say that they had since been busily engaged on an equipment for an output of 10,000 kw., which would be larger than many of the town supply stations in this country. As every modern device was being fitted to produce economical working, he was hopeful that this station would compare favourably with any in the kingdom. Another generating set of 1,000 kw. was also being added to the earlier station. They had also been entrusted by the Admiralty with important work concerning which he might say more in the future. They were lighting aerodromes in various parts of the country, and were busy with power and lighting contracts in a number of industrial factories. Their Manchester branch had continued its prosperity, and the managers were to be congratulated on the results shown. The wholesale merchanting department, which was conducted as a separate business, had again advanced in turnover, and an important order had been obtained for electrical supplies to meet the needs of our American Allies in France. The new works were found in every respect to be an improvement on those previously occupied, and the staff were busy with switchboard work of all kinds and various war appliances. In regard to the future, he was optimistic, especially if the recommendations of the Electrical Trades Committee (on which he had the pleasure of serving) were accepted by the Government and acted upon without further delay. In the published report it was shown that an annual saving of 100 million pounds could be effected in this country if electric power was universally adopted—a sum sufficient to pay the interest on 2,000 millions of war stock. With electricity "on tap" throughout the country there must needs be a demand for the services of those who had had the necessary training and experience to show manufacturers how to utilise the current to the best advantage. In this connection they were preparing a scheme of guarantees which would relieve large users from all anxiety as to the saving they would be able to affect.

Nairobi Electric Power and Lighting Co., Ltd.—Sir A. Mayo-Robson, presiding at the annual meeting, said that the sale of current produced a trifle less revenue than in the previous year. Salaries and wages showed a considerable increase. The balance to net revenue was £8,021, as against £8,013, and seeing that they were not in a position to increase the price of their commodity, but had heavy increase in expenses, the result was satisfactory. They were still carrying on under the difficulties that all in like circumstances had been experiencing. Though the war was now happily ended, it must continue to exercise a deterrent effect upon new commercial developments for some time to come.

Amazon Telegraph Co., Ltd.—Gross revenue for year ended June 30th, 1918, £80,455; working expenses £31,598. After providing for income tax, depreciation of investments, and debenture interest, and putting £17,000 to general reserve, a dividend of 4½ per cent., less tax, is paid, carrying forward £6,842. The managing director, Mr. F. E. Noseworthy, who has been at Para and Rio de Janeiro on the company's business during the whole of the past financial year, has now returned.

Oriental Telephone & Electric Co., Ltd.—At an extraordinary meeting called for Wednesday, it was proposed to pass a resolution declaring that £1 6s. per ordinary share—being part of the moneys resulting from the conversion into money and collection of certain capital assets, and being surplus money, notwithstanding the distribution of which there will still remain assets sufficient to answer in full the whole of the liabilities and paid-up share capital—be appropriated as capital among the holders of the ordinary shares.

British Ever-Ready Co., Ltd.—Ten per cent. on the preference for the half-year ended September; interim dividend of 7½ per cent. on the ordinary.

Indian Electric Supply and Traction Co., Ltd.—Interim dividend of 2½ per cent.

STOCKS AND SHARES.

Tuesday Evening.

All markets round the Stock Exchange underwent a sharp reaction within a few days of the signing of the armistice. Free sales of stock encountered little fresh buying, and directly the downward tendency manifested itself, there came a rush to realise. On top of this, the close approach of a General Election was announced. This conjured up visions of the Labour Party showing unexpected strength at the polls, and at once affected the Home Railway stocks. It has, moreover, the invariable influence of keeping capital away from the Stock Exchange until the political excitement shall be overpast. People—investors and speculators alike—affirm their intention of keeping resources as liquid as possible for the rest of the year, and so the Stock Exchange languishes in reaction following upon the buoyancy and good business that ruled just before the armistice was signed.

Nevertheless, there are competent judges who think that the fall has already made sufficient progress to attract buyers on the look-out for cheap stock, and a turn upwards before Christmas would occasion no particular surprise.

In the minor slump that has taken place, Home Railway stocks, as already indicated, have occupied a front seat. Undergrounds suffered with the rest. The mysterious rise in Metropolitan Consolidated, which caused surprise to many of us, turns out to have no special backing, and the price came down with a run. The deferred dividend stock also gave way. Districts had their advance some weeks ago, and part of this has now been shed. The income bonds and shares of the Underground Co. have gone back materially from the best. East Londons keep tolerably steady, but the whole market is dull and heavy, in striking contrast to the brightness prevailing a week or two ago.

Electric lighting shares hold with conspicuous strength their recent gains. The market is one of the very few round the Stock Exchange that has not been touched by what the financial scribe loves to call the general malaise. In spite of the fact that electric lighting shares were put up so suddenly, further advances have occurred, and demand is still keen, although perhaps rather less eager than it was in the early days of this month. Quotations show up exceedingly well throughout the list.

In the after-war problems now under discussion, it is as fitting as it is natural that attention should turn to the question of electric power and supply. The recommendations of the Committee that was appointed to consider this many-sided

subject have assumed a practical aspect denied them while the war was being waged. Now, they are receiving attentive consideration as coming within the pale of practical politics, and they are big with possibilities which no longer appear to be purely academic. We observe a note of anxiety in some quarter lest the development of the national scheme should profit private purses instead of being utilised for the common benefit.

South American Tramways issues are also exceptional in their resistance to the depression amongst Stock Exchange markets. So far as the Argentine companies are concerned this improvement is due to the legitimate hope of coal once more becoming available for operations. That the southern half of the American continent should be badly off for coal is somewhat astonishing, but the fact remains, and companies dependent upon coal for their working have had a thin time during the war because of the lack of ships to take it there. But now Anglo-Argentine Tramways shares are steadily advancing, and the Brazilian group has gone back, despite the favourable movements of the rate of exchange. Mexicans have again improved, and British Columbians are better.

British Westinghouse preference are flat on the proposed reduction in their dividend. Telegraph Constructions are £1 down. Other manufacturing shares keep steady. The rubber market is firm, and armaments have moved hardly at all. Marconis have again given way, in sympathy with other shares of semi-speculative character. Americans eased off to 31s., though Marines remain fairly firm at 3½. The list of cable companies' issues is quiet. Investment in these, as in high-class stocks as a whole, is checked by the political uncertainties, and also by an idea that money rates may stiffen up appreciably when the terms of the armistice are carried out, and the door is opened wide for Peace to enter.

SHARE LIST OF ELECTRICAL COMPANIES.

	Dividend 1916.	Dividend 1917.	Price Nov. 18, 1918.	Rise or fall.	Yield p.c.
Home Electricity Companies.					
Brompton Ordinary	9	10	67	+ ½	£7 5 6
Charing Cross Ordinary	5	4	3½	—	5 14 4
do. do. do. 4½ Pref.	4½	4½	8½	—	6 13 4
Chelsea	3	5	8¾	+ ½	6 18 0
City of London	8	8	13½	—	5 18 6
do. do. 6 per cent. Pref.	6	6	10½	—	5 18 5
County of London	7	7	11½	+ ½	6 5 7
do. do. 6 per cent. Pref.	6	6	10½	+ ½	5 18 5
Kensington Ordinary	6	7	5½	+ ½	6 7 3
London Electric	Nil	Nil	1¾	—	Nil
do. do. 6 per cent. Pref.	4	5	4	+ ½	6 5 0
Metropolitan	3	4	3¾	—	6 3 1
do. 4½ per cent. Pref.	4½	4½	8½	—	6 18 6
St. James' and Pall Mall	8	9	7¾	+ ½	6 6 4
South London	5	5	3	—	6 13 4
South Metropolitan Pref.	7	7	20⅞	—	6 16 7
Westminster Ordinary	7	9	7¾	+ ½	6 6 4
Telegraphs and Telephones.					
Anglo-Am. Tel. Pref.	6	6	99	—	6 1 0
do. Def.	1½	1½	23⅜	—	6 8 6
Chile Telephone	8	8	7½	—	5 6 8
Cuba Sub. Ord.	7	7	10½	—	*6 13 4
Eastern Extension	8	8	15⅞	— ¼	*5 1 7
Eastern Tel. Ord.	8	8	16½	—	*4 19 1
Globe Tel. and T. Ord.	7	7	14½	—	*4 16 5
do. do. Pref.	6	6	10½	—	5 14 3
Great Northern Tel.	24	22	84	—	6 9 5
Indo-European	13	13	58½	—	5 11 0
Marconi	15	20	4½	— ½	4 9 0
Oriental Telephone Ord.	10	10	9½	—	2 17 2
United R. Plate Tel.	8	8	7⅞	—	*5 5 0
West India and Panama	6d.	1/3	1⅜	—	*3 12 6
Western Telegraph	8	8	16½	— ½	*4 15 7
Home Rails.					
Central London Ord. Assented	4	4	65½	—	6 2 2
Metropolitan	—	1	26½	—3/8	3 15 6
do. District	Nil	Nil	24½	—3	Nil
Underground Electric Ordinary	Nil	Nil	3⅜	+ ⅛	Nil
do. do. "A"	Nil	Nil	8/9	—9d.	Nil
do. do. Income	6	4	88½	—2½	*4 10 5
Foreign Trams, &c.					
Adelaide Sup. 6 per cent. Pref.	6	6	42	—	6 6 4
Anglo-Arg. Trams. First Pref.	5¼	5¼	4¾	+ ⅛	—
do. do. 2nd Pref.	5¼	—	3	—	—
do. do. 5 Deb.	5	5	77½	—	6 9 0
Brazil Tractions	—	—	57	— ⅜	—
Bombay Electric Pref.	6	6	102	—	5 11 7
British Columbia Elec. Rly. Pfce.	5	5	66	— ½	7 11 5
do. do. Preferred	Nil	Nil	48½	+1	Nil
do. do. Deferred	Nil	Nil	46½	+1	Nil
do. do. Deb.	4½	4½	63	+1	6 17 3
Mexico Trams 5 per cent. Bonds	Nil	Nil	67	—	Nil
do. 6 per cent. Bonds	Nil	Nil	53	+2	Nil
Mexican Light Common	Nil	Nil	40	+2½	Nil
do. Pref.	Nil	Nil	50	—	Nil
do. 1st Bonds	Nil	Nil	72	—	—
Manufacturing Companies.					
Babcock & Wilcox	15	15	36	—	4 2 4
British Aluminium Ord.	10	10	11⅜	—	5 12 4
British Insulated Ord.	20	20	24	—	4 9 6
British Westinghouse Pref.	7½	7½	2⅝	+ ⅛	6 3 0
Callenders	20	25	94	—	6 8 0
do. 5 Pref.	5	5	5½	—	—
Castner-Kellner	22	20	35	—	5 10 4
Edison-Swan, "A"	—	—	1	—	Nil
do. do. 4 per cent. Deb.	4	4	75¼	—	5 6 0
Electric Construction	7½	10	1⅜	—	7 12 6
Gen. Elec. Pref.	6	6	102	—	6 2 4
do. Ord.	10	10	18	—	*5 11 1
Henley	25	25	2½	—	5 11 4
do. 4½ Pref.	4½	4½	4	—	5 12 6
India-Rubber	10	10	17½	—	*5 14 3
Telegraph Con.	20	20	48	—1	*4 19 0

*Dividends paid free of Income Tax.

MARKET QUOTATIONS.

It should be remembered, in making use of the figures appearing in the following list, that in some cases the prices are only general, and they may vary according to quantities and other circumstances.

Wednesday, November 20th.

CHEMICALS, &c.		Latest Price.	Fortnight's Inc. or Dec.
a Acid, Oxalic	per lb.	1/8	..
a Ammoniac Sal	per ton	£100	..
a Ammonia, Muriate (large crystal)	"	£77	..
a Bisulphide of Carbon	"	..	..
a Borax	"	£43	..
a Copper Sulphate	"	£40	£2 dec.
a Potash, Chlorate	per lb.	2/4	..
a " Perchlorate	"	2/-	..
a Shellac	per cwt.	£17 10/-	..
a Sulphate of Magnesia	per ton	£15	..
a Sulphur, Sublimed Flowers	"	£34	..
a " Lump	"	£36	..
a Soda, Chlorate	per lb.	1/1	..
a " Crystals	per ton	170/-	..
a Sodium Bichromate, casks	per lb.	..	..
METALS, &c.			
c Brass (rolled metal 2' to 12' basis)	per lb.	..	..
c " Tubes (solid drawn)	"	..	..
c " Wire, basis	"	..	..
c Copper Tubes (solid drawn)	"	1/8½ to 1/0	..
g " Bars (best selected)	per ton	£161	..
g " Sheet	"	£161	..
g " Rod	"	£161	..
d " (Electrolytic) Bars	"	£157	..
d " " Sheets	"	£161	..
d " " Wire Rods	"	£145	..
d " " H.C. Wire	per lb.	1/5½	..
f Ebonite Rod	"	8/-	..
f " Sheet	"	2/6	..
n German Silver Wire	"	2/6	..
h Gutta-percha, fine	"	6/10	..
h India-rubber, Para fine	"	2/10	1½d. inc.
i Iron Pig (Cleveland warrants)	per ton	Nom.	..
i " Wire, galv. No. 8, P.O. qual.	"	£37	..
g Lead, English Pig	"	..	..
g Mercury	per bot.	Nom.	..
e Mica (in original cases) small	per lb.	9d. to 4/6	..
e " " " medium	"	5/- to 10/-	..
e " " " large	"	12/6 to 25/- & up.	..
d Silicium Bronze Wire	per lb.	1/10	..
r Steel, Magnet, in bars	per ton	..	..
g Tin, Block (English)	"	..	..
n " Wire, Nos. 1 to 16	per lb.	5/-	..

Quotations supplied by—

a G. Boor & Co.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
l Richard Johnson & Nephew, Ltd.
n P. Ormiston & Sons.
r W. F. Dennis & Co.

Electric Construction Co., Ltd.—Interim dividends in respect of the year ending March 31st, 1919, at the rate of 7 per cent. per annum on the preference shares, less income tax, and at the rate of 6 per cent. per annum on the ordinary shares, less tax.

Adelaide Electric Supply Co., Ltd.—Final dividend of 7 per cent., free of British income-tax, on the ordinary shares, making 12 per cent. for the year.

Melbourne Electric Supply Co., Ltd.—Final dividend of 5 per cent., free of British income-tax, on the consolidated ordinary stock, making 10 per cent. for the year.

Ministry of Munitions.—In the House of Commons on Tuesday, Mr. Kellaway, moving the second reading of the Ministry of Munitions Bill, said that in carrying out its work the Ministry had been compelled to issue orders controlling the production, supply, and the price of certain materials. Now the necessity for these orders had greatly diminished, if it had not entirely passed away, and the problem was to get back the country's industries as rapidly and effectively as possible. Whilst it was true that certain raw materials and articles were no longer immediately necessary for the purposes for which the Ministry was established, these were in urgent demand for purposes of peace production. Indeed, the demand greatly exceeded the supply. For instance, so far as building bricks were concerned, he was informed that the supply was equal to only 50 per cent. of the demand. That applied to other articles. Such being the case, unless there was some form of control the result would be chaos, and the prices charged to the consumer would be greatly in excess of those prevailing under the orders of the Ministry now in existence. The result would be that there could be no restraining of profiteering. There was no desire on the part of the Ministry to continue in existence a moment longer than was necessary in the interests of industry. There was nothing in the Bill which extended the powers of the Ministry. All it was intended to do was to enable them to bridge over the interregnum. The Bill was read a third time.

HIGH-PRESSURE CONVERTERS.

By J. HUMPHREY.

The use of high-pressure direct current on electric railways, notably in America, has given rise to new problems in connection with the construction and operation of converters. The first 1,200- and 1,500-volt converter plants consisted of two 600- or 750-volt rotaries, connected in series, and apart from being liberally insulated did not differ from ordinary machines. Rotary converters are now built, however, for pressures up to 1,500 volts, but only for 25 and 33 cycles. When the alternating current is drawn from 60-cycle systems, as on the Chicago, Milwaukee, and St. Paul Railroad, the current is converted by means of motor-generators; but it is obviously preferable, in the interests of efficiency, to avoid the use of motor-generators if possible. With a 25 or 33-cycle supply and a track pressure of not more than 1,500 volts, conversion can be effected, and is effected, by rotary converters designed for the pressure named.

The main difficulty with machines of this sort is that of avoiding flashing over at the brushes when short-circuits occur on the line. Even ordinary 600-volt rotaries are not, of course, entirely immune from this fault; indeed, the early 600-volt rotaries were very troublesome in this respect, especially those working at a periodicity of 60 cycles. The use of commutating poles has done much to improve operation as far as sparking is concerned, and on high-voltage machines they are very essential, owing to the high voltage between commutator segments and the high commutator speeds, but commutating poles will not prevent flashing over when shorts occur in close proximity to the machines. At high loads saturation of the commutating poles and distorting influences prevent the desired commutating field being attained, and, with sudden changes of load, the changes in the field strength cannot be synchronised. The strength and distribution of the flux emanating from the commutating poles, at times of heavy overloads, do not by any means conform to the requirements necessary to obtain sparkless operation. Experiments have been conducted with a view to making the commutating field respond to rapid and severe current fluctuations, such as those which arise from bad short-circuits, and one of the most important conclusions arrived at is that when the commutating pole windings have shunts connected in parallel with them, such shunts must possess inductance as well as resistance. But, in any case, flashing over cannot be avoided, or even diminished to any appreciable extent, with the aid of commutating poles. With ordinary machines controlled with ordinary circuit-breakers, the best remedy is to avoid the use of short feeders, for it is perfectly clear that the greater the resistance of the feeder circuits the smaller will be the short-circuit currents. In many cases where car sheds have been fed in the immediate vicinity of substations, very bad flashing has been experienced when short-circuit occurred outside, but by cutting out the shortest feeders the trouble has been greatly diminished. Serious consideration has also been given to the question of introducing reactances in feeder circuits to prevent the current rising to a value greater than about ten times the normal value before the circuit-breaker opens; but a study of this matter has shown that the practice is not, as a rule, desirable, on account of the cost of the coils and the space they occupy, and, further, on account of the inductive kick, which would have a tendency to maintain an arc across the contacts of circuit-breakers. On the whole, it is preferable to limit the current by means of a resistance normally short-circuited by a quick-acting circuit-breaker, which, when it opens, first connects the resistance in series with the machine and then opens the circuit entirely. Another scheme, which does not, however, appear to have made any appreciable headway, is to make the circuit-breaker automatically insert resistance in the field circuit, so that at times of short-circuits the voltage of the machine is reduced.

Recent investigations prove conclusively that this flashing-over trouble, most pronounced in the case of machines working at high voltages, can be considerably reduced if the circuit be interrupted with a high-speed breaker. The more rapidly the breaker opens the higher may be the current, which will not cause flashing between brush spindles. Ordinary circuit-breakers are much too sluggish in their action to avoid flashing under ordinary short-circuit conditions, although, if the feeders have sufficient resistance to limit the current to the critical value, flashing over may only occur on rare occasions. Recent tests, carried out by the General Electric Co. of U.S.A., have shown that with specially constructed circuit-breakers, operating in about 0·005 of a second, 60-cycle rotaries can be short-circuited without flashing over; but in order to secure complete immunity from the trouble, under the most adverse conditions, it has been found advisable to fit the brush spindles of converters with special barriers and arc-quenching devices. If the arc formed between two commutator segments is not blown out, as they pass from under the brushes and from one set of brushes to the next, and all the following segments have similar arcs formed between them, the arc will form a short-circuit between positive and negative brush spindles, and it therefore follows that the time taken for the circuit-breaker to open should not exceed the time corresponding to one-half of a complete alternating cycle. But even with circuit-breakers capable of opening at this rapid rate a flash-over may occur owing to the vapour formed by the arc being blown across the commutator by windage or by an increase in the periodicity, when the circuit-breaker will no longer operate with the requisite speed. A circuit-breaker capable of being satisfactory in this connection must open within 0·007 of a second, in order adequately to protect converters working at ordinary periodicities, and the design of such circuit-breakers has proved a somewhat difficult task. Series blow-out coils have had to be used instead of shunt coils, because the latter will not establish the blow-out field quickly enough. The strength of the blow-out coil field, moreover, must be many times greater than that of a coil belonging to a circuit-breaker operating at normal rate, whilst the moving parts must be as light as possible, consistent with strength. Furthermore, experiments indicate that in order to avoid flashing at the converter brushes, the circuit-breakers should first insert resistance in the circuit, and afterwards completely open the circuit, but the resistance should not reduce the current to too low a value.

When a circuit-breaker completely opens the circuit in a single operation, the tendency for converters to flash over is greater than when the breaker first introduces resistance, and it has therefore been deemed advisable to make these high-speed breakers insert resistance before the circuit is finally broken. Investigations have also indicated that converter circuits can be broken at the desired rate with the aid of silver fuses; but, owing to the trouble of replacing them, the employment of high-speed breakers is preferable. The type of breaker which seems to have given the best results with high-pressure machines has two operating coils, a hold-on coil, and an opposing coil in series with the main circuit; when the current becomes excessive, as the result of a short, the ampere-turns of the series coil greatly exceed those of the hold-on coil, and the breaker flies open. High-speed circuit-breakers of this description greatly minimise the risk of rotary converters and other converters flashing over, although in the absence of barriers between brush spindles complete immunity from the trouble cannot be ensured. But if the converters are fitted with proper barriers and controlled with high-speed breakers flashing over is not likely to occur, even under the most adverse conditions; as, for instance, when short-circuits occur in close proximity to the machines. Special barriers have recently been designed with a view to dissipating the arc and so preventing it extending between brush spindles. These barriers consist of boxes made of fire-proof insulating material and fitting closely round each set of brushes, and so that there is only a very small clearance between the lower end and the commutator, whilst on the side of each box towards which the commutator rotates is a slanting fire-proof scoop, also made of insulating material. The lower end of each scoop, like the lower end of each box, is very close to the commutator, and on each scoop are mounted two metal screens, about one inch apart, one screen having a coarse mesh and other a fine mesh, the function of these screens being to act as

arc coolers. When a short-circuit occurs, the scoops pick up the arc from the commutator and deflect it on to the metal screens, which cool and extinguish the arc, and, consequently, flashing between brush spindles is eliminated. Tests have shown conclusively that when converters are fitted with barriers and these arc-quenching screens, and are controlled with high-speed circuit-breakers, complete protection is secured, and that it is impossible to make a machine flash over, even under the most adverse conditions.

NEW ELECTRICAL DEVICES, FITTINGS, AND PLANT.

Readers are invited to submit particulars of new or improved devices and apparatus, which will be published if considered of sufficient interest.

The Siemens Vacuum Arrester.

We have received from Messrs. Siemens Brothers & Co., Ltd., Woolwich, London, S.E. 18, an illustrated descriptive pamphlet (V. 535) dealing with the Siemens vacuum arrester, and the following particulars will show briefly the advantages claimed of this form of arrester.

The enclosure of the opposing conductors in a partial vacuum causes them to break down reliably at about 300 volts (R.M.S. value of alternating potential), and thus all dangerous voltages are removed from the line. The vacuum is designed to carry a current sufficiently great, and of sufficient duration, to blow fuses having a capacity higher than those usually employed either in telephone or telegraph work. An insulation resistance of approximately 3,000 megohms is maintained right up to the point of breakdown. When heavy discharges occur the electrodes do not become welded together, nor have they to be renewed after discharge. This is due to the relatively large separation permitted by the use of a vacuum chamber. A damaged arrester can be immediately replaced by

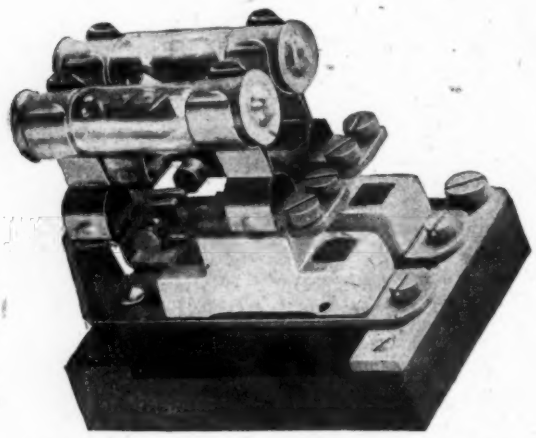

Fig 1.—Metallic-Circuit Vacuum Protector, Indoor Pattern.

withdrawing the damaged vacuum tube and inserting a new one. Being contained in a hermetically-sealed vacuum chamber, the protector, besides being highly sensitive, is also dust, damp, and insect proof.

The foregoing recital of the functions performed by the vacuum arrester has related primarily to the protection afforded to apparatus and its users against high potential discharges only, but there remains the question of damage which may result from currents of abnormal size. Protection from the latter may be guarded against by the use of fuses so proportioned as to operate when currents of more than a predetermined strength flow in the circuit. When the route of a telephone or telegraph line is one which is entirely remote from any possible contact with high-tension circuits, it is customary to use lightning arresters only, but owing to the rapid increase in electric traction, lighting and power transmission circuits, such remoteness is becoming quite exceptional, and thus it is now the general practice to install both lightning arresters and fuses in order to provide adequate protection to both the apparatus and the users of telephone and telegraph circuits.

Where both arresters and fuses are fitted, the general method of connecting the protective devices is to bring the line wires through fuses to the vacuum arresters. With this arrangement, presuming the fuses to be correctly proportioned, high potentials are removed from the lines without blowing the fuses, unless the current flowing through the circuit is in excess of the predetermined strength, in which case the fuses blow, and thereby disconnect the line. As a further precaution against "sneak currents" (*i.e.*, small currents which would not operate the fuse, but which, if allowed to flow for a considerable time, would burn out the apparatus), it is often necessary to fit a heat coil, which is then located on the apparatus side of the arrester.

Fig. 1 illustrates a suitable piece of apparatus for indoor use, and figs. 2 and 3 show the same arrangement mounted in a weather-proof case for fitting outside a building.

Figs. 2 and 3.—Metallic-Circuit Vacuum Protector, Outdoor Pattern, with and without Cover.

It is a matter of opinion whether protective devices should be fitted in weather-proof cases on the terminal pole, or whether they should be installed inside the building, as near as possible to the point of entry of the line wires. Probably the selection of position would be governed by local conditions, and the pamphlet gives particulars of apparatus designed for use in either position.

A New Distribution Pole Fixture.

There has always been a need for an economical and substantial distribution-pole fixture of neat appearance, which will firmly grip the pole without weakening it. Such a fixture has been invented and patented by F. M. Simpson, Montreal, says the *Canadian Electrical News*, and the accompanying illustration (fig. 4) shows the use of this device on concrete poles in Toronto. The fixtures or cross-arms with accommodation for insulators are made of

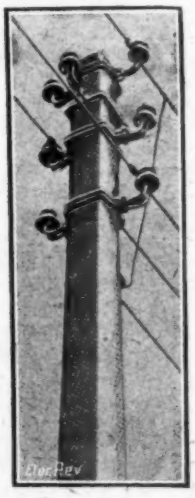

Fig. 4.—Distribution Pole, showing Fixtures.

steel channels, hot galvanised and rust-proof. The attachment portion of the arm, which is really the patented feature of the device, is in the form of an adjustable collar with the heads of the clamping bolts held by the flanges of the channel, making spring washers or lock nuts unnecessary, to prevent creeping. The use of a wrench is all that is required to make the fixture absolutely rigid. The channel sections afford sufficient spring-giving tension to meet weather conditions. The pole grip

is especially adaptable to concrete and metal poles, as these are generally uniform in size. Its use on wooden poles makes the cutting of a gain unnecessary, as the web of the channel bites into the pole and holds the cross arm without the aid of drift bolts or coach screws. Fixtures having the same principle of pole attachment are made in several forms for two and three wire circuits, and for carrying strand wire supporting cable. The fixtures are being made in Hamilton, Canada, by the Acme Stamping and Tool Works.

Colliery Transformers.

The use of transformers in collieries having extensive underground workings, permits important economies to be realised in the cost of in-bye cables, by allowing the high-tension supply to be brought close to the working face, with consequent saving of copper. We have received from Messrs. Johnson & Phillips, Ltd., Charlton, S.E. 7, a newly published leaflet (No. T 1/47, Sept., 1918) dealing with such transformers which have been specially designed for colliery work. They are made in standard units of a convenient size, any number of which can be connected together,

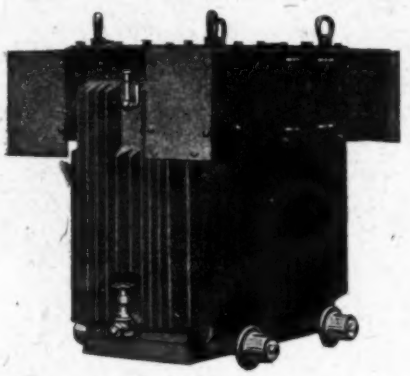

Fig. 5.—J. & P. Colliery Transformer.

for use in parallel, through the bus-bar chambers on each side, as shown in fig. 5, with covers fitted. As will be seen, they are provided with flanged wheels to run on the colliery tracks. Their portability, convenient size, and the ease of extending a working unit, render them particularly suitable for use in mines, where space and particularly head room is generally very limited. The transformers are, of course, of the oil-immersed type; oil-level gauges and draw-off cocks are fitted as shown.

Two Handy Tools.

We illustrate below (figs. 6 and 7) two handy home-made tools which we feel sure will be found useful by those who may have occasion to use such devices from time to time.

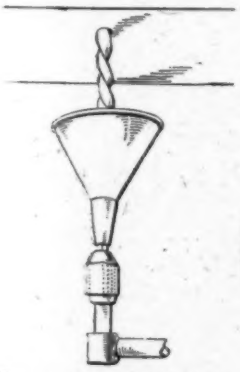

Fig. 6.—Chip Guard for Overhead Drilling.

Fig. 7.—Hand Device for Bending Pipe or Conduit.

Both devices are quite simple and easy to make, the illustrations both being self-explanatory. Referring to fig. 7, it may be mentioned that the wheel is slightly grooved to prevent slipping sideways.—*Power.*

Ellison's Motor-Ampere Calculator.

We have received from Messrs. Geo. Ellison, 25, Victoria Street, Westminster, a device which is intended to save time in connection with the installation of electric motors. We have grown accustomed to talking of the use of electric power in industry, and we are apt to overlook that in every instance the motors have to be handled by the electrical-power contractor, who, in addition to fixing the motor, must also arrange the correct size of the cable with which to supply it. The Ellison ampere-calculator is intended to relieve them of the trouble of constantly working out the current required for the motors they are installing and the nearest size of cable suitable for use in connecting up with the power circuit. The calculator is simplicity itself. It comprises a chart which reads in horse-power up to 100 and in amperes up to 200. The horse-power is read off in vertical lines and the amperes in horizontal lines. The centre of the chart is occupied by four arcs reading in voltages from 1 to 600 one-phase D.C., two-phase, and three-phase circuits respectively. Pivoted at the left-hand bottom corner is a narrow strip of celluloid, which sweeps over the whole of the diagram and which can be moved so that its left-hand edge, when placed against the voltage of the motor, gives a reading of the amperes where it intercepts the horse-power line. At the left-hand of the chart is a column containing figures which give the nearest standard V.I.R. cable, S.W.G., I.E.E., rating to the current shown in the column immediately adjoining. The calculator measures 14 in. deep by 12 in. wide, and can either be hung on the wall or stood on the desk. It is finished in best washable gelatine and has every appearance of being built to withstand hard usage.

THE INDUSTRIAL DEVELOPMENT OF INDIA.

This was the subject of an address delivered to the members of the Eighty Club by Mr. Alfred Dickinson, M.Inst.C.E., of which we have received a copy, profusely illustrated with excellent reproductions of views of the Tata Hydro-electric Power Supply Undertaking which were shown at the meeting. The installation was described in our issues of May 7th and 14th, 1915. Mr. Dickinson stated that if this country was to participate in the development of the industries of India, it must be understood that India's political sentiment and commercial intelligence were such that the Indian was willing to join us in partnership, but would not accept us in a higher capacity. We must be prepared to be fellow-workers and friends, and we must not be more modest about our good qualities than our competitors were in their claims. It was absolutely essential to raise the status of the working population, and labour honestly rendered should be encouraged by being honestly paid for. The development of any civilised country must perforce be carried out by the men of the country; future development, therefore, very largely depended on the treatment meted out to the Indian business man by the Government official. Cheap power supply was one of the important essentials in the development of industry.

Mr. Dickinson then described the Tata hydroelectric scheme, which differed from all other such projects in that the valleys in which vast quantities of water were now stored were, before the construction of the dams, dry valleys; three lakes had been created, having a surface area of 5,700 acres. The success of the scheme was due to the natural features of the district, which not only provided these capacious valleys for storage, but also a site for a forebay 1,735 ft. above the valley in which the power house was built, and requiring a pipe line only 2¼ miles long. The station was designed for 108,000 H.P., of which 67,500 H.P. was at work. The power was transmitted to Bombay, 43 miles, at 100,000 volts. So satisfactory had been the supply afforded by this undertaking that a similar plant was being installed in the same district, the Andhra Valley Power Supply, and contracts had been entered into for 50,000 H.P. at ¼d. per unit.

The necessity for cheap power was as pressing here as in India or any other country. So long as the present restrictions remained it would be impossible to give the consumer really cheap power. The generation of electrical energy in the future must be on a vastly larger scale than in the past, and its production would form only part of a multiplicity of processes—more in the nature of a by-product than a main product. In order to secure this, the producer of the future must become a general manufacturer, producing many chemical combinations, such as fertilisers, dyes, disinfectants, medicines, oils, &c. He might even become a producer of steel and other metals.

Reverting to the development of India, Mr. Dickinson urged that the Government should undertake a complete investigation of the possible sources of water power in that country, making the information available for public use. As the result of investigations made at the expense of Messrs. Tata, Sons & Co., Bombay, it could now be demonstrated that by damming a valley in the Western Ghats, water from the Koyna River could be stored so as to provide about 300,000 H.P. continuously, on sound commercial lines. This, in his opinion, was a discovery of the highest importance to the whole of the East; it was equivalent to supplying to industries during the normal working hours of 3,600 per annum no less than 730,000 H.P., at, say, ¼d. per H.P.-hour. This should give to India the greatest industrial impulse she was ever likely to receive from any single discovery.

The price of coal throughout the world was rising faster than the interest on capital, tending to reduce the disparity in capital cost between water-power and steam-power.

The output of the Tata Iron & Steel Works, since its opening in 1912, had grown to 200,000 tons per annum, and extensions now in hand would raise the output capacity to 1,000,000 tons. There had been in Great Britain a great want of appreciation of the possibilities of industrial development in India; but the educated Indian realised those possibilities. An Industrial Bank had been established to finance existing and new industries, with a

capital of £8,000,000, and should prove of the greatest possible service to Indian industrial development. During the war American and Japanese manufacturers had made rapid strides towards securing for their products the Indian market. Since impartial British rule had so stabilised the country as to make it practicable for its industrial resources now to be developed, it was surely not asking from the Indian too much in return that he should give preferential treatment to British manufacturers.

In a paper read before the Institution of Civil Engineers on Tuesday last, Mr. R. B. Joyner, C.I.E., M.Inst.C.E., described the Tata hydro-electric works, with special reference to the hydraulic features of the undertaking. The works described take advantage of the very heavy rainfall on the precipitous edge of the Western Ghats, about 2,000 feet above, and about 40 miles from, Bombay. As the rain falls only during three or four months of the year, and the water-courses are dry all the rest of the year, it was necessary to store water sufficient to give about 100,000 H.P. for ten or twelve hours a day during about nine months of the year. The combined available capacities of the storage lakes are about 10,100 million cubic feet, whilst the water required to give 100,000 H.P. ex turbines for nine months, allowing for the great loss by evaporation and by soakage, and for friction in the pipes and turbines, is 6,700 million cubic feet. The excess capacity is given owing to the very variable amounts of the monsoon rains, so as to carry on the balances in years of excessive rainfall to make up for the occasional short monsoons.

The works are notable for the following reasons: They are the largest of the many similar hydro-electric works which have been constructed during the past 10 or 20 years, taking into consideration the great head used, combined with the large discharge of water. The first is equal to about five times the height of St. Paul's Cross, and the latter is greater than the summer flow of the river Thames during five months. They are also the first works to store water for power use during about three-fourths of the year. One of the masonry dams, taking the exposed face area, is probably the largest yet constructed. The works are probably unique, considering the very heavy rainfall and the very steep rocky slopes, giving the greatest discharge perhaps ever recorded. The catchment-area of the two lakes is only 16¼ square miles, while of this the full lake area is about 7¼ square miles.

The works described are the first to be undertaken of a number of similar works proposed by the author, he having shown that it is financially possible in India to store water for use during eight or nine months of the year, and give power at a much cheaper cost than by the use of coal, oil, or spirit from vegetable products; likewise cheaper than power from the wind, sun, or tides. Not only that, but the water after use is available for irrigation, so valuable in a country without a drop of rain for a large part of the year. This would ensure the growth of the raw materials required for finished products for which the country is now so dependent upon other countries. It would also supply the factory workers or others with food and drink, and help to prevent famines, besides doing much to regularise the rainfall. Such power would provide electric traction for raw materials to, and finished products from, the factories, as well as light for them and neighbouring towns, produce fertilisers, and give the great heat required for the smelting of ores. Many industries would then be self-contained, and India could compete with Europe, America, or Japan for its finished products, and would become less dependent upon its agriculture, which the varying seasons render somewhat capricious.

Mr. Joyner was the designer of the work, and as hydraulic consulting engineer superintended the construction; Mr. Alfred Dickinson, M.Inst.C.E., was the general consulting engineer for the undertaking, including the electrical work, and Mr. B. D. Richards, B.Sc., M.Inst.C.E., was the resident engineer.

The total cost of the work described in the paper will be £942,000 when complete, in addition to the cost of land, engineering, administration, &c.

NEW PATENTS APPLIED FOR, 1918.

(NOT YET PUBLISHED.)

Compiled expressly for this journal by MESSRS. SEFTON-JONES, O'DELL AND STEPHENS (successors to W. P. Thompson & Co., of London), Chartered Patent Agents, 285, High Holborn, London, W.C.).

17,985. "Securing an electro-deposited tip on a propeller blade." R. H. BUNKITT. November 4th.

17,995. "Detection of varying magnetic field." F. O. HUNT. November 4th.

18,011. "Vacuum breakers for liquid condensers." BRITISH WESTINGHOUSE ELECTRIC & MANUFACTURING CO. November 4th. (U.S.A., November 6th, 1917.)

18,013. "Removable electric fuse carriers." W. T. HENLEY'S TELEGRAPH WORKS CO. & W. H. NICHOLLS. November 4th.

18,025. "Magneto-electric ignition machines." SCINTILLA. November 4th. (Germany, November 2nd, 1917.)

18,033. "Telephone transmitters." A. MCNALLY. November 4th.

18,044. "Ignition devices for internal-combustion engines." C. WEISS. November 4th.

18,046. "Telegraphy." T. B. DIXON. November 4th. (U.S.A., November 7th, 1917.)

18,048. "Frictionless electric switch." G. N. DE SEYSSEL. November 4th.

18,051. "Dynamo-electric machines." H. F. JOEL. November 4th.

18,054. "Electric snap switches." EDISON SWAN ELECTRIC CO. & F. SHERGOLD. November 4th.

18,069. "Electrical meter controllers." W. F. STAMP. November 4th.

18,070. "Electromagnetic wave-transmission and reception arrangements." P. P. ECKERSLEY. November 4th.

18,071/2. "Electromagnetic wave-transmitting and receiving systems." P. P. ECKERSLEY. November 4th.

18,073. "Electromagnetic wave-transmitting and receiving systems." P. P. ECKERSLEY & R. WHIDDINGTON. November 4th.

18,074. "Electromagnetic wave navigational systems." J. ROBINSON. November 4th.

18,075. "Electromagnetic wave navigational arrangements." J. ROBINSON. November 4th.

18,076. "Electromagnetic wave navigational arrangements." J. MURRAY AND J. ROBINSON. November 4th.

18,077. "Electromagnetic wave-reception arrangements." J. ROBINSON. November 4th.

18,078. "Electromagnetic wave-signalling systems." N. LEA. November 4th.

18,079. "Electrical socket connections." H. J. POOL. November 4th.

18,080. "Braided electrical conductors." R. WHIDDINGTON. November 4th.

18,081. "Electromagnetic wave-signalling systems." R. WHIDDINGTON. November 4th.

18,082. "Electromagnetic transmission of sound." R. WHIDDINGTON. November 4th.

18,084. "Vibrating contacts." A. J. ROBERTS. November 4th.

18,086. "Electrical ignition for internal-combustion engines." W. PECKARD. November 5th.

18,088. "Electrical signalling systems for motor vehicles." NAILIK MOTOR SIGNAL CO. & J. P. OGDEN. November 5th.

18,089. "Magneto ignition machines, and mechanism for driving same." F. H. BRAMLEY. November 5th.

18,101. "Efectric concertina-accordion." N. W. M. HOLT. November 5th.

18,108. "Aeronautical dynamos." G. E. MORTLEY. November 5th.

18,115. "Magnetic devices for drawing cog in mesh on electric machines." R. H. LANE. November 5th.

18,135. "Electrolysis of chlorides of alkaline metals." NORSK ALKALI AKTIESELSKABET. November 5th. (Norway, December 13th, 1917.)

18,146. "Sparking plugs and their manufacture." K. E. L. GUINNESS. November 5th.

18,154. "Renewable filament and standard electric incandescent lamp." L. P. MORINAN & A. B. WHITEFIELD. November 6th.

18,155. "Self-cleaning sparking plug." A. W. NICHOLAS. November 6th.

18,207/8. "Rotating magnets of magneto-electric ignition apparatus." SCINTILLA. November 6th. (Germany, November 6th, 1917.)

18,209. "Dynamo-electric machines." ENCLOSED MOTOR CO. & P. A. H. MOSSAY. November 6th.

18,212. "Electric lampholders." H. MANSELL. November 6th.

18,216. "Equitable cyclic distribution of monophase charge at phases of polyphase feed circuit." F. B. BASSANESE & U. MAGINI. November 6th.

18,249. "Ignition magnetos for internal-combustion engines." H. W. F. IRELAND & H. LUCAS. November 7th.

18,252. "Protection of alternating-current electrical machinery." E. P. HOLLIS. November 7th.

18,259. "Radio-telephonic apparatus." M. LATOUR. November 7th. (France, November 30th, 1916.)

18,306. "Spark-obtaining means for internal-combustion engines." H. BOWKER, W. H. MARSTON & S. H. SERSHALL. November 8th.

18,319. "Means for indicating position of buttons of electric bells or switches." H. D. HARBEN. November 8th.

18,321. "Automatic regulating systems for dynamo-electric machines." BRITISH THOMSON-HOUSTON CO. (General Electric Co., U.S.A.) November 8th.

18,338. "Switch-type incandescent lampholders." N. COLLINS. November 8th.

18,339. "Electrodes." J. H. GARBETT. November 8th.

18,353. "Collection of electric current by electrically-propelled vehicles from overhead conductors." E. M. MUNRO. November 9th.

18,358. "X-ray photography." G. S. WHITEFIELD. November 9th.

18,370. "Renewal of filaments in metal-filament electric lamps." S. COXON & W. A. WILLIAMS. November 9th.

18,395. "Telephone receivers." S. G. BROWN. November 9th.

18,396. "Electrical welding." T. E. MURRAY. November 9th.

PUBLISHED SPECIFICATIONS.

The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1917.

10,106. IGNITION MAGNETOS FOR FOUR-CYLINDER INTERNAL-COMBUSTION ENGINES. R. A. Persin & H. A. Lefevre. July 12th, 1916. (108,476.)

13,697. METHOD OF AND MEANS FOR ELECTRICALLY PRODUCING A GAS SUITABLE FOR USE IN INTERNAL-COMBUSTION ENGINES AND FOR OTHER PURPOSES. T. McClelland. September 24th, 1917. (119,885.)

14,908. ELECTROMAGNETIC FRICTION BRAKES MORE ESPECIALLY INTENDED FOR THE DRIVING AND CHANGE-SPEED GEAR OF MOTOR ROAD VEHICLES. G. Pollard and Menco-Elma Syndicate. October 15th, 1917. (119,897.)

14,999. PROTECTIVE DEVICES FOR ELECTRICAL CABLES OR CABLE NETWORKS. F. F. P. Bissacre and Metz & McLellan. October 16th, 1917. (119,906.)

15,556. GUARDS FOR ELECTRIC HEAT RADIATORS, GAS FIRES, AND THE LIKE. A. F. Berry. October 23th, 1917. (119,922.)

15,992. INCANDESCENT ELECTRIC LAMPS. R. Butler. November 2nd, 1917. (119,928.)

16,286. TERMINAL CONNECTORS FOR ELECTRICAL CONDUCTORS. O. Zimmerman. November 7th, 1917. (119,932.)

16,516. JOINTED ARMS OR BRACKETS FOR CARRYING INCANDESCENT ELECTRIC LAMPS OR INCANDESCENT GAS LAMPS. H. C. Tofield. November 10th, 1917. (Cognate application 7,356/18.) (119,934.)

16,708. PROTECTIVE DEVICES FOR ALTERNATING-CURRENT ELECTRIC SYSTEMS. A. E. McColl. November 14th, 1917. (Patent of addition not granted.) (119,937.)

16,727. APPARATUS FOR FILLING RECEPTACLES WITH LIQUID. H. Dean and Chloride Electrical Storage Co. November 14th, 1917. (119,938.)

16,892. ILLUMINATING DEVICES. British Thomson-Houston Co. & H. C. Wheat. November 16th, 1917. (119,939.)

17,224. DYNAMO-ELECTRIC MACHINES. H. Lucas, C. L. Breeden & H. L. Cape. November 22nd, 1917. (119,942.)

1918.

79. ARRANGEMENTS FOR SECURING ELECTRIC CONTACT IN OVERHEAD TROLLEYS FOR TRAMCARS AND OTHER ELECTRICALLY-DRIVEN VEHICLES. A. C. Franklin. July 2nd, 1918. (119,958.)

305. SPARKING PLUGS AND THE LIKE, SUCH AS USED FOR IGNITING GASEOUS MATTER IN COMBUSTIBLE ENGINES. G. H. Ward. January 8th, 1918. (119,962.)

809. ELECTRIC WELDING SYSTEMS. British Thomson-Houston Co. (General Electric Co., U.S.A.) January 14th, 1918. (119,780.)